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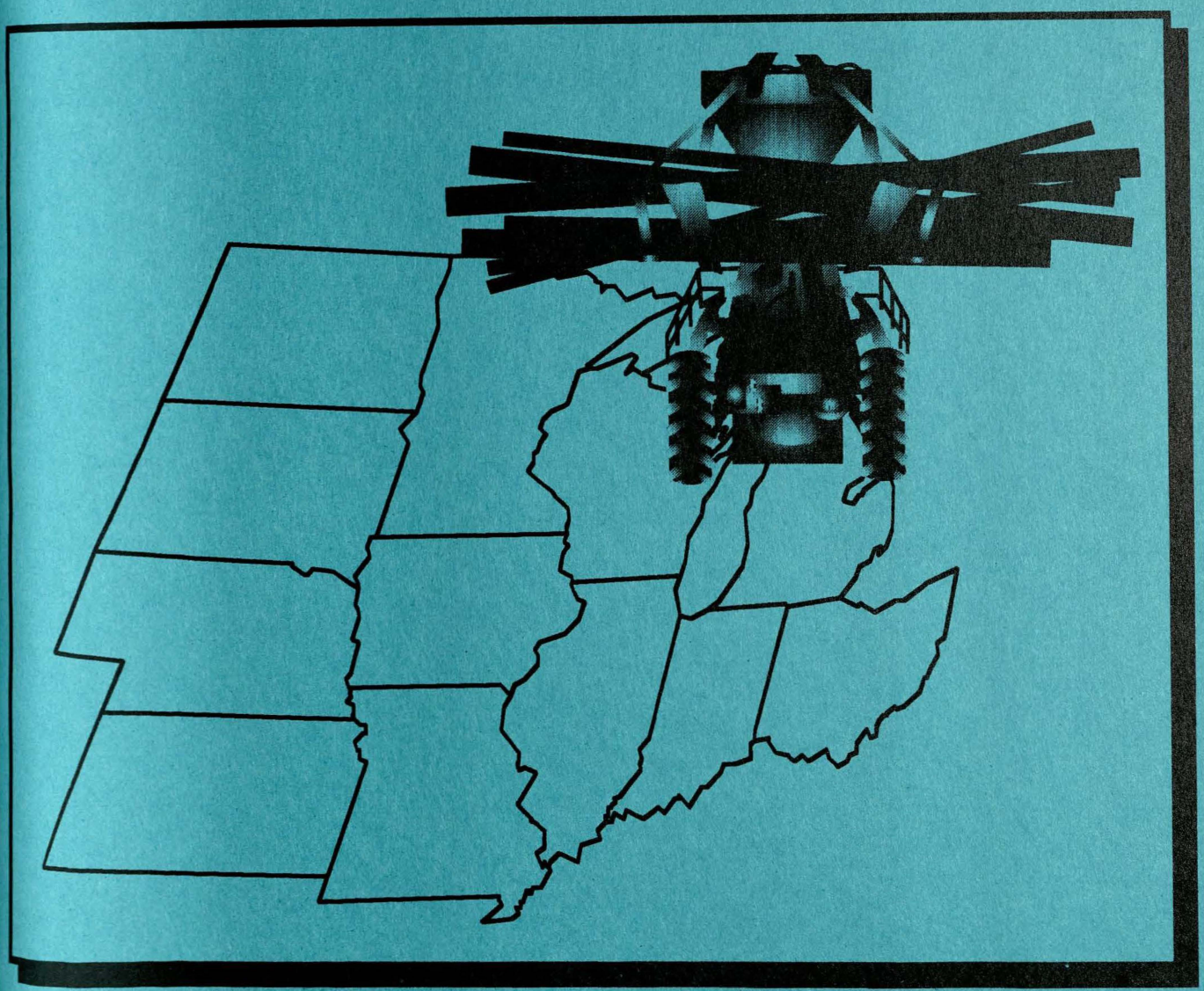
Pulpwood Production in the North-Central Region, 1994

Ronald J. Piva



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NOTE: This report includes all primary products made from reconstituted wood fiber. In addition to woodpulp, this includes particleboard and engineered lumber products[1] made from chips, shavings, wafers, flakes, strands, and sawdust. This report presents the production by county of the raw fiber material delivered to mills. Thus, these data report only that portion of the timber harvest used as raw material and do not necessarily reflect the volume of growing stock harvested.

Pulpwood constitutes more than half the industrial timber products harvested annually in the Lake States (Michigan, Minnesota, and Wisconsin) and is an important product in the Central States (Illinois, Indiana, Iowa, and Missouri) and the Plains States (Kansas, Nebraska, North Dakota, and South Dakota).

Current detailed information about pulpwood production[2] is necessary for intelligent planning and decisionmaking in wood procurement, forest resource management, forest industry development, and scientific studies.

Since 1979, we have included logs, bolts, and wood residue used in manufacturing flake board, wafer board, oriented strand board, and medium density fiberboard in this annual report. Engineered lumber was included in this report in 1992. Together, these products are called particleboards, and all mills manufacturing these boards will be called particleboard mills in this paper. Wood used at particleboard mills is identical or nearly identical to wood used at pulp mills; therefore, including this wood in our study provides a more accurate estimate of demand for pulpwood-like material.

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Particleboard mills were in their infancy before 1979 and used primarily aspen and wood residue. Therefore, data for these mills do not distort roundwood use trends for other species nor preclude comparing 1994 survey results with those of 1978 and previous years.

Pulp and particleboard mills using North Central States timber in 1994 reported their pulpwood receipts[3] by species group and county of origin. This report presents the results of the survey, analyzes the data, compares results with those of 1993 or earlier years, and discusses trends in pulpwood production and use.

The Lake States, Central States, and Plains States are discussed separately because the timber types in each area are different, the flow of wood between the areas is nominal, and more detailed data on pulpwood production and receipts in the Central and Plains States might reveal the operations of individual mills. This is the 36th annual report of the pulpwood harvest in Lake States counties, the 35th annual report of the Central States harvest, and the 2nd report of the pulpwood harvest in the Plains States.

Several mills purchase their pulpwood based on weight rather than volume. Conversion factors to convert green tons of pulpwood to standard cord equivalents are shown in the Appendix.

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[1] *U.S. Forest Products Laboratory. 1974. Wood handbook: wood as an engineering material. Agric. Handb. 72. Washington, DC: U.S. Department of Agriculture, Forest Service: 23-27. (Revised.)*

[2] *Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut, plus the annual wood residue volume produced by sawmills, veneer mills, etc., used for pulp, particleboard, wafer board, oriented strand board, medium density fiberboard, or engineered lumber.*

[3] *Pulpwood receipts are the volume of wood received by mills in a specific State or region, regardless of the geographic source.*

LAKE STATES

PRODUCTION

- Pulpwood production as a whole increased to 9.7 million cords[4] in 1994 from 9.4 million cords in 1993, a rise of 4 percent (table 1). Of each cord produced, 92 percent came from roundwood (including chips from roundwood) and 8 percent came from the residue[5] of wood-using plants (fig. 1).

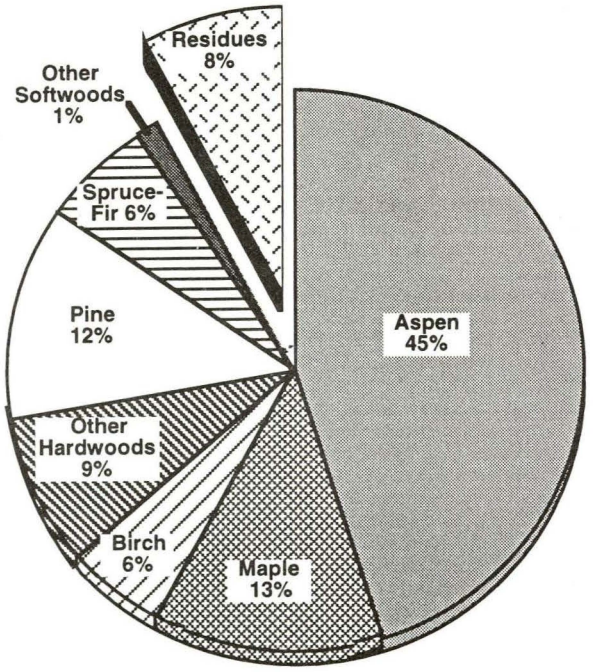


Figure 1.—*Lake States pulpwood production by species group and residues, 1994.*

- Hardwoods constituted 78 percent of the total pulpwood production.
- Principal species of roundwood harvested in 1994 were aspen (4.4 million cords), jack pine (810 thousand cords), hard maple (685 thousand cords), soft maple (573 thousand cords), and white birch (497 thousand cords).
- Aspen remained the dominant species of pulpwood roundwood harvested—49 percent of the total.
- Softwood roundwood production increased by less than one-half percent to 1.9 million cords in 1994. Pulpwood production from softwood residue rose to 243 thousand cords, a 38-percent increase from the previous year (fig. 2).

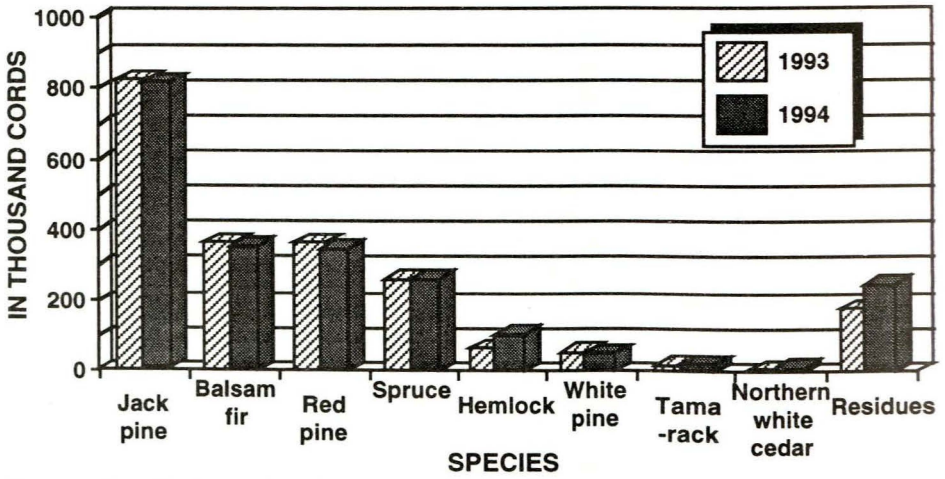


Figure 2.—*Softwood pulpwood production in the Lake States, 1993-1994.*

[4] *All references to cords are in standard cords. A standard cord is 128 cubic feet of wood, bark, and air space.*

[5] *Residue is the byproduct from sawmills, veneer mills, cooperage mills, and other wood-using mills that is used for pulping and particleboard. Residue includes slabs, edgings, veneer cores, sawdust, fines, woodflour, and chips manufactured from slabs, edgings, and veneer cores.*

Table 1. -- Production and imports of pulpwood, Lake States, 1994[1]

(In standard cords, unpeeled)

Product form, species group and destination	Production by State[2]			Regional total	Imports				Total imports	Total receipts
	Michigan	Minnesota	Wisconsin		Central States	Plains States	Other U.S.[3]	Canada		
Roundwood										
Northern white-cedar										
Michigan	8,023	-	176	8,199	-	-	-	-	-	8,199
Total	8,023	-	176	8,199	-	-	-	-	-	8,199
Balsam fir										
Canada	3,648	-	-	3,648	-	-	-	-	-	-
Michigan	77,492	-	1,712	79,204	-	-	-	-	-	79,204
Minnesota	8,694	185,034	12,929	206,657	-	-	-	-	-	206,657
Wisconsin	12,935	49	48,532	61,516	-	-	-	-	-	61,516
Total	102,769	185,084	63,172	351,025	-	-	-	-	-	347,377
Hemlock										
Michigan	65,379	-	1,567	66,946	-	-	-	-	-	66,946
Wisconsin	2,713	-	31,563	34,275	-	-	-	-	-	34,275
Total	68,091	-	33,130	101,221	-	-	-	-	-	101,221
Jack pine										
Michigan	184,883	-	1,942	186,824	-	-	-	-	-	186,824
Minnesota	-	82,924	4,436	87,360	-	-	-	-	-	87,360
Wisconsin	87,732	15,179	433,227	536,138	-	-	-	2,126	2,126	538,264
Total	272,614	98,103	439,605	810,322	-	-	-	2,126	2,126	812,448
Red pine										
Michigan	43,284	-	592	43,876	-	-	-	-	-	43,876
Minnesota	-	19,681	5,706	25,387	-	-	-	-	-	25,387
Wisconsin	12,755	2,264	258,229	273,248	-	-	-	-	-	273,248
Total	56,040	21,945	264,526	342,511	-	-	-	-	-	342,511
White pine										
Michigan	13,943	-	295	14,238	-	-	-	-	-	14,238
Wisconsin	1,049	67	33,196	34,312	-	-	-	-	-	34,312
Total	14,992	67	33,492	48,550	-	-	-	-	-	48,550
Spruce										
Canada	7,753	-	-	7,753	-	-	-	-	-	-
Michigan	17,712	-	392	18,104	-	-	-	-	-	18,104
Minnesota	7,469	128,035	2,343	137,847	-	-	-	-	-	137,847
Wisconsin	29,147	36,938	28,048	94,133	-	-	-	3,978	3,978	98,111
Total	62,081	164,973	30,783	257,837	-	-	-	3,978	3,978	254,062
Tamarack										
Michigan	6,948	-	159	7,106	-	-	-	-	-	7,106
Minnesota	-	27	-	27	-	-	-	-	-	27
Wisconsin	676	2,909	8,396	11,981	-	-	-	-	-	11,981
Total	7,624	2,937	8,555	19,115	-	-	-	-	-	19,115
All softwood roundwood										
Canada	11,401	-	-	11,401	-	-	-	-	-	-
Michigan	417,663	-	6,834	424,498	-	-	-	-	-	424,498
Minnesota	16,163	415,702	25,413	457,278	-	-	-	-	-	457,278
Wisconsin	147,006	57,406	841,191	1,045,603	-	-	-	6,104	6,104	1,051,708
Total	592,234	473,108	873,438	1,938,781	-	-	-	6,104	6,104	1,933,484
Residues, softwood										
Canada	-	10,103	-	10,103	-	-	-	-	-	-
Michigan	69,253	-	10,244	79,497	-	-	-	13,718	13,718	93,215
Minnesota	-	92,012	-	92,012	-	-	-	2,488	2,488	94,500
Wisconsin	2,954	542	57,790	61,286	-	46,503	34,429	16,738	97,670	158,955
Total	72,207	102,656	68,034	242,897	-	46,503	34,429	32,944	113,876	346,671
All softwoods										
Canada	11,401	10,103	-	21,504	-	-	-	-	-	-
Michigan	486,916	-	17,078	503,995	-	-	-	13,718	13,718	517,713
Minnesota	16,163	507,714	25,413	549,290	-	-	-	2,488	2,488	551,778
Wisconsin	149,960	57,948	898,981	1,106,889	-	46,503	34,429	22,842	103,774	1,210,663
Total	664,440	575,765	941,472	2,181,678	-	46,503	34,429	39,049	119,981	2,280,154

(Table 1 continued on next page.)

(Table 1 continued.)

Product form, species group and destination	Production by State[2]			Regional total	Imports				Total imports	Total receipts
	Michigan	Minnesota	Wisconsin		Central States	Plains States	Other U.S.[3]	Canada		
Roundwood										
Ash										
Michigan	35,931	78	4,065	40,074	-	-	-	110	110	40,184
Minnesota	-	1,780	-	1,780	-	-	-	-	-	1,780
Wisconsin	2,573	1,343	63,208	67,123	-	-	-	-	-	67,123
Total	38,504	3,200	67,273	108,977	-	-	-	110	110	109,087
Aspen										
Canada	-	26,817	-	26,817	-	-	-	-	-	-
Michigan	976,577	-	57,370	1,033,946	-	-	-	49,682	49,682	1,083,628
Minnesota	1,231	2,065,133	24,176	2,090,539	-	2,500	-	98,449	100,949	2,191,488
Wisconsin	106,499	63,319	1,077,651	1,247,468	-	-	-	2,404	2,404	1,249,872
Total	1,084,306	2,155,268	1,159,197	4,398,771	-	2,500	-	150,535	153,035	4,524,988
Balsam poplar										
Michigan	68,717	-	5,095	73,812	-	-	-	41	41	73,853
Minnesota	-	122,028	-	122,028	-	-	-	12,063	12,063	134,091
Wisconsin	349	-	991	1,340	-	-	-	-	-	1,340
Total	69,066	122,028	6,086	197,179	-	-	-	12,104	12,104	209,283
Basswood										
Michigan	58,929	74	6,463	65,466	-	-	-	106	106	65,572
Minnesota	-	1,497	-	1,497	-	-	-	-	-	1,497
Wisconsin	2,066	1,159	48,145	51,370	-	-	-	-	-	51,370
Total	60,995	2,730	54,608	118,333	-	-	-	106	106	118,439
Beech										
Michigan	31,536	-	124	31,659	-	-	-	45	45	31,704
Wisconsin	-	-	787	787	-	-	-	-	-	787
Total	31,536	-	911	32,446	-	-	-	45	45	32,491
White birch										
Michigan	169,483	9,544	49,718	228,745	-	-	-	2,187	2,187	230,932
Minnesota	-	29,142	-	29,142	-	-	-	-	-	29,142
Wisconsin	5,743	36,398	196,677	238,818	-	-	-	120	120	238,938
Total	175,226	75,084	246,395	496,705	-	-	-	2,307	2,307	499,012
Yellow birch										
Michigan	36,983	53	2,928	39,964	-	-	-	97	97	40,061
Wisconsin	386	-	13,455	13,841	-	-	-	-	-	13,841
Total	37,369	53	16,383	53,805	-	-	-	97	97	53,902
Cottonwood										
Michigan	2,109	-	-	2,109	-	-	-	-	-	2,109
Wisconsin	-	-	981	981	-	-	-	-	-	981
Total	2,109	-	981	3,090	-	-	-	-	-	3,090
Elm										
Michigan	456	-	18	474	-	-	-	-	-	474
Wisconsin	155	-	27,459	27,614	-	-	-	-	-	27,614
Total	611	-	27,477	28,088	-	-	-	-	-	28,088
Hickory										
Michigan	209	-	-	209	-	-	-	-	-	209
Total	209	-	-	209	-	-	-	-	-	209
Hard maple										
Michigan	393,318	1,029	51,435	445,782	-	-	-	2,808	2,808	448,591
Minnesota	-	987	-	987	-	-	-	-	-	987
Wisconsin	8,796	745	229,131	238,673	-	-	-	-	-	238,673
Total	402,114	2,762	280,566	685,442	-	-	-	2,808	2,808	688,251
Soft maple										
Michigan	327,306	535	27,199	355,040	-	-	-	2,793	2,793	357,833
Minnesota	-	20,571	3,725	24,296	-	-	-	-	-	24,296
Wisconsin	6,874	2,610	184,690	194,174	-	-	-	-	-	194,174
Total	334,180	23,716	215,614	573,510	-	-	-	2,793	2,793	576,303
Red oak										
Michigan	125,872	53	2,802	128,728	-	-	-	79	79	128,807
Minnesota	-	296	400	696	-	-	-	-	-	696
Wisconsin	3,434	5	116,425	119,864	-	-	-	-	-	119,864
Total	129,307	354	119,626	249,287	-	-	-	79	79	249,366
White oak										
Michigan	36,134	-	-	36,134	-	-	-	-	-	36,134
Wisconsin	820	-	36,605	37,424	-	-	-	-	-	37,424
Total	36,954	-	36,605	73,559	-	-	-	-	-	73,559
Other hardwoods										
Michigan	17,306	16	969	18,290	-	-	-	26	26	18,316
Wisconsin	791	-	14,868	15,659	-	-	-	-	-	15,659
Total	18,096	16	15,837	33,949	-	-	-	26	26	33,975

(Table 1 continued on next page.)

(Table 1 continued.)

Product form, species group and destination	Production by State[2]			Regional total	Imports				Total imports	Total receipts
	Michigan	Minnesota	Wisconsin		Central States	Plains States	Other U.S.[3]	Canada		
All hardwood roundwood										
Canada	-	26,817	-	26,817	-	-	-	-	-	-
Michigan	2,280,864	11,383	208,186	2,500,433	-	-	-	57,975	57,975	2,558,408
Minnesota	1,231	2,241,434	28,300	2,270,965	-	2,500	-	110,512	113,012	2,383,977
Wisconsin	138,485	105,578	2,011,072	2,255,136	-	-	-	2,524	2,524	2,257,660
Total	2,420,581	2,385,211	2,247,559	7,053,351	-	2,500	-	171,011	173,511	7,200,045
Residues										
Hardwood										
Canada	-	4,470	-	4,470	-	-	-	-	-	-
Michigan	147,179	-	15,535	162,714	15,594	-	-	-	15,594	178,308
Minnesota	-	63,259	956	64,215	-	-	-	603	603	64,818
Wisconsin	21,540	104	257,352	278,996	200	-	-	-	200	279,196
Other[4]	-	-	2,318	2,318	-	-	-	-	-	-
Total	168,719	67,834	276,160	512,713	15,794	-	-	603	16,397	522,322
All hardwoods										
Canada	-	31,287	-	31,287	-	-	-	-	-	-
Michigan	2,428,043	11,383	223,721	2,663,147	15,594	-	-	57,975	73,569	2,736,716
Minnesota	1,231	2,304,693	29,256	2,335,180	-	2,500	-	111,115	113,615	2,448,796
Wisconsin	160,026	105,682	2,268,424	2,534,132	200	-	-	2,524	2,724	2,536,856
Other[4]	-	-	2,318	2,318	-	-	-	-	-	-
Total	2,589,300	2,453,045	2,523,719	7,566,064	15,794	2,500	-	171,614	189,908	7,722,367
Total all roundwood										
Canada	11,401	26,817	-	38,218	-	-	-	-	-	-
Michigan	2,698,528	11,383	215,021	2,924,931	-	-	-	57,975	57,975	2,982,906
Minnesota	17,394	2,657,136	53,713	2,728,243	-	2,500	-	110,512	113,012	2,841,255
Wisconsin	285,491	162,985	2,852,263	3,300,739	-	-	-	8,628	8,628	3,309,367
Total	3,012,815	2,858,319	3,120,997	8,992,131	-	2,500	-	177,115	179,615	9,133,528
Total all residues										
Canada	-	14,573	-	14,573	-	-	-	-	-	-
Michigan	216,432	-	25,779	242,210	15,594	-	-	13,718	29,313	271,523
Minnesota	-	155,271	956	156,227	-	-	-	3,091	3,091	159,318
Wisconsin	24,494	646	315,142	340,282	200	46,503	34,429	16,738	97,869	438,151
Other[4]	-	-	2,318	2,318	-	-	-	-	-	-
Total	240,926	170,490	344,195	755,610	15,794	46,503	34,429	33,547	130,273	868,993
All wood material										
Canada	11,401	41,389	-	52,791	-	-	-	-	-	-
Michigan	2,914,960	11,383	240,799	3,167,142	15,594	-	-	71,693	87,287	3,254,429
Minnesota	17,394	2,812,407	54,669	2,884,470	-	2,500	-	113,603	116,103	3,000,574
Wisconsin	309,985	163,630	3,167,405	3,641,021	200	46,503	34,429	25,366	106,498	3,747,519
Other[4]	-	-	2,318	2,318	-	-	-	-	-	-
Total	3,253,741	3,028,809	3,465,191	9,747,741	15,794	49,003	34,429	210,663	309,888	10,002,521

[1] Table may not add due to rounding.

[2] Vertical columns of figures under the box heading "Production by State" present the amount of roundwood cut or residue generated in each state.

[3] Mostly Western States.

[4] Pulpwood shipped to mills outside of region.

- Whole-tree-chip[6] (WTC) production, which makes up 7 percent of the total pulpwood production in the Lake States, increased 13 percent to 679 thousand cords in 1994 (fig. 3).

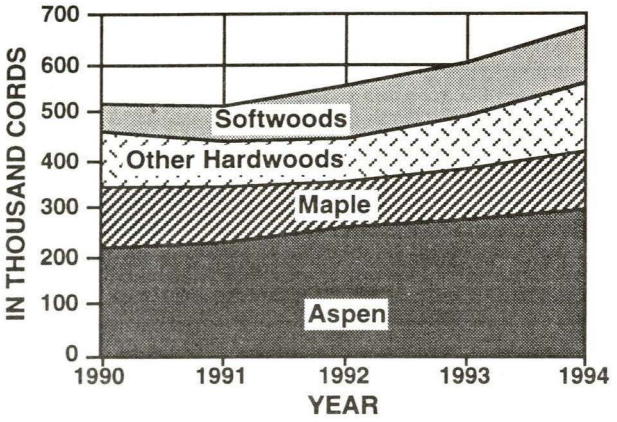


Figure 3.—*Whole-tree-chip production in the Lake States, 1990-1994.*

- Michigan was the major producer of whole-tree chips in the Lake States in 1994 with 448 thousand cords (66 percent of the WTC production) (fig. 4).

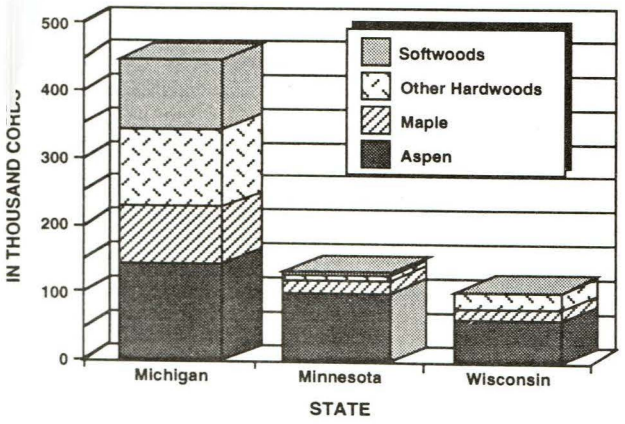


Figure 4.—*WTC production by State in the Lake States, 1994.*

- Aspen was the predominant species used in WTC in 1994 with 302 thousand cords, 44 percent of the total WTC production.

- Jack pine was the predominant softwood species used in WTC in 1994, making up 96 percent of the softwood WTC production and 16 percent of the total WTC production.

Michigan

- Michigan pulpwood production rose 3 percent to 3.3 million cords in 1994 (fig. 5).

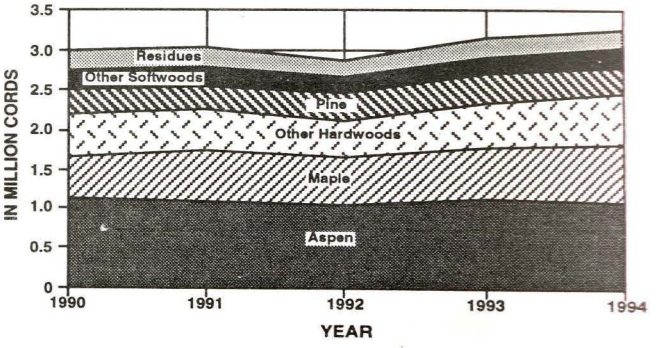


Figure 5.—*Michigan pulpwood production by species group and residues, 1990-1994.*

- The Western Upper Peninsula was the top producing region in the State in 1994 with 38 percent of the roundwood harvested (fig. 6).

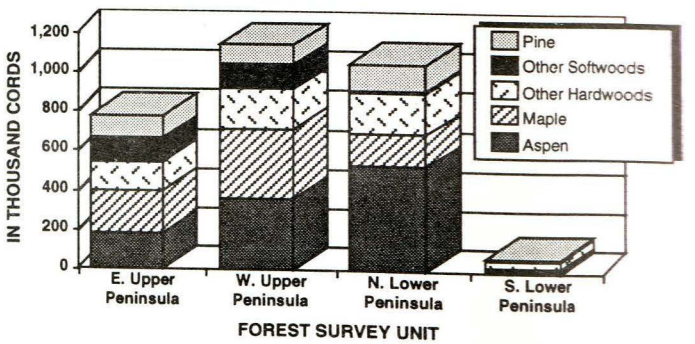


Figure 6.—*Michigan roundwood pulpwood production by Forest Survey Unit and species groups, 1994.*

[6] *Pulpwood produced from chipping entire trees (all portions of the trees above ground, except the stumps).*

- Marquette County in the Western Upper Peninsula was the top producing county in the State with 326 thousand cords.

- Roundwood pulpwood production in 1994 increased 9 percent in the Western Upper Peninsula, increased only 2 percent in the Northern Lower Peninsula, remained the same in the Southern Lower Peninsula, and decreased 1 percent in the Eastern Upper Peninsula.

Minnesota

- Pulpwood production including residues increased 2 percent to 3.0 million cords in 1994 (fig. 7).

- The Aspen-Birch Unit became the top pulpwood producing area in the State in 1994 with 1.32 million cords, followed by the Northern Pine Unit with 1.28 million cords (fig. 8).

- Aspen pulpwood production decreased 29 thousand cords in 1994 to 2.2 million cords, a 1-percent decrease over the previous year.

- After increasing in 1993, softwood roundwood production decreased 8 percent or 43 thousand cords in 1994.

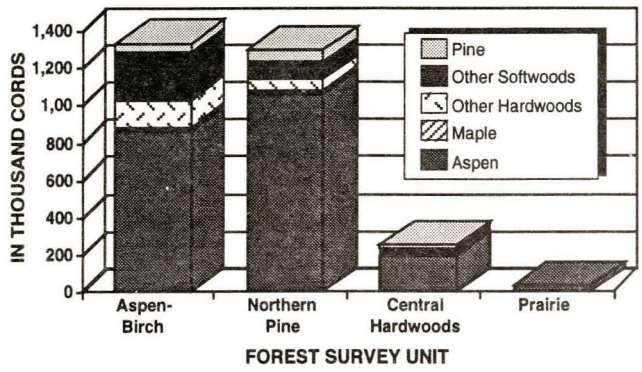


Figure 8.—*Minnesota roundwood pulpwood production by Forest Survey Unit and species group, 1994.*

- St. Louis County, in the Aspen-Birch Unit, remained the top producing county with 622 thousand cords, a 6-percent decrease from the previous year.

- Roundwood pulpwood production increased by 52 percent or 12 thousand cords in the Prairie Unit and by 36 percent or 59 thousand cords in the Central Hardwood Unit. It decreased by 1 percent or 12 thousand cords in the Aspen-Birch Unit and by 4 percent or 58 thousand cords in the Northern Pine Unit.

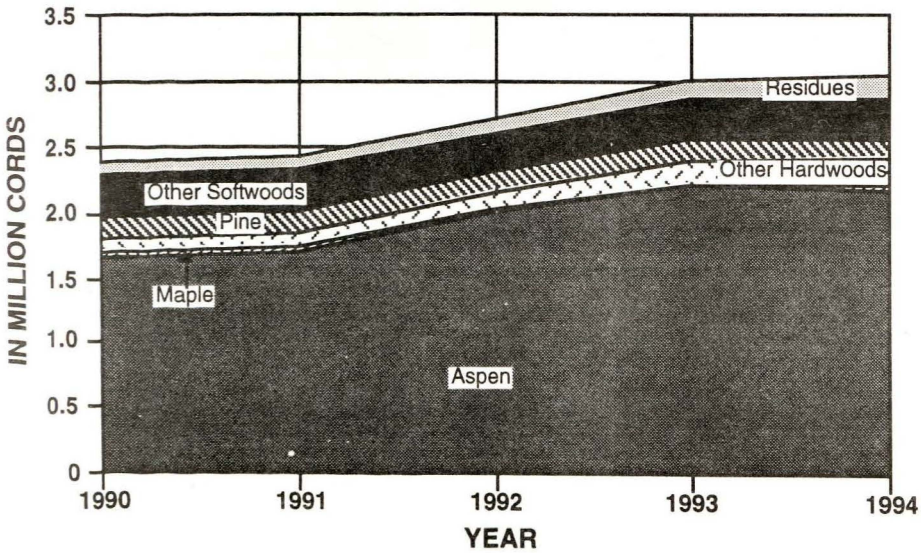


Figure 7.—*Minnesota pulpwood production by species group and residues, 1990 -1994.*

Wisconsin

- Pulpwood production in Wisconsin increased by 6 percent to 3.5 million cords in 1994, the largest increase of the three Lake States (fig. 9).

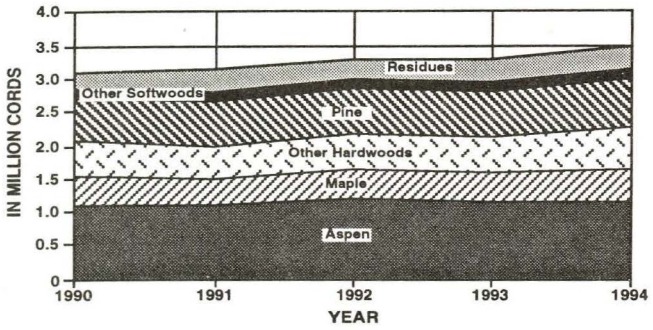


Figure 9. — *Wisconsin pulpwood production by species group and residues, 1990-1994.*

- Aspen harvests increased by 3 percent to 1.2 million cords in 1994 and accounted for 37 percent of the total harvest.

- Pine pulpwood production in Wisconsin accounted for 24 percent of the total harvest.

- The Northwest and Northeast Units were the top pulpwood producing areas in the State in 1994 with 1.3 million cords and 1.1 million cords, respectively (fig. 10).

- Bayfield County in the Northwest Unit was the top pulpwood producing county in the State with 197 thousand cords.

Harvesting Intensity

- In this report, we show the distribution of the harvest in two ways: first, the amount of pulpwood cut relative to the growing-stock volume in each of five major pulpwood species (fig. 11); and, second, the amount of pulpwood cut relative to commercial timberland area (fig. 12).

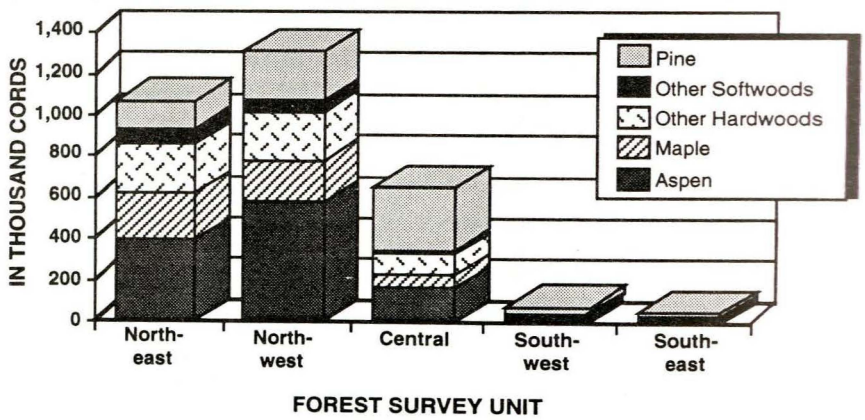


Figure 10.—*Wisconsin roundwood pulpwood production by Forest Survey Unit and species group, 1994.*

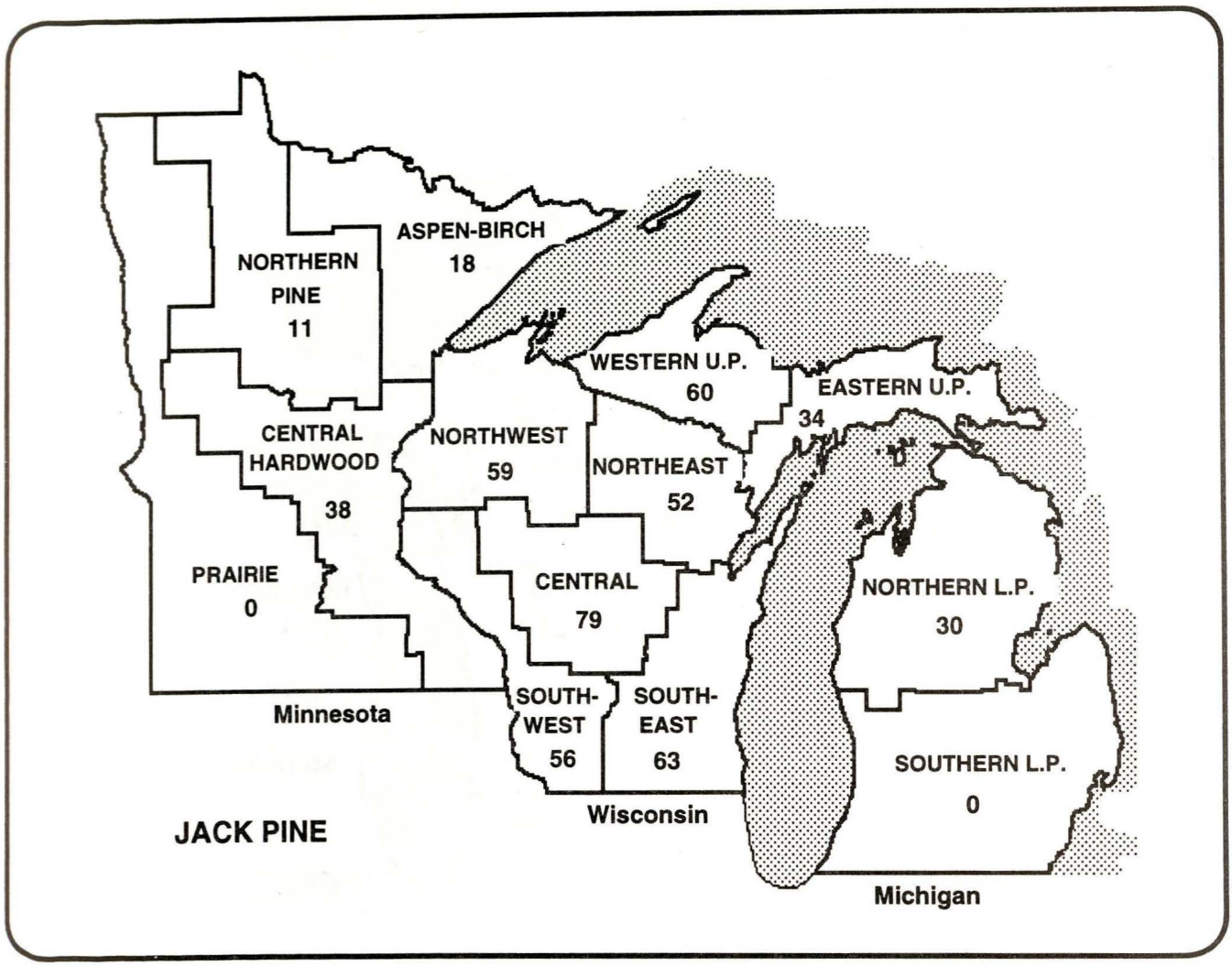
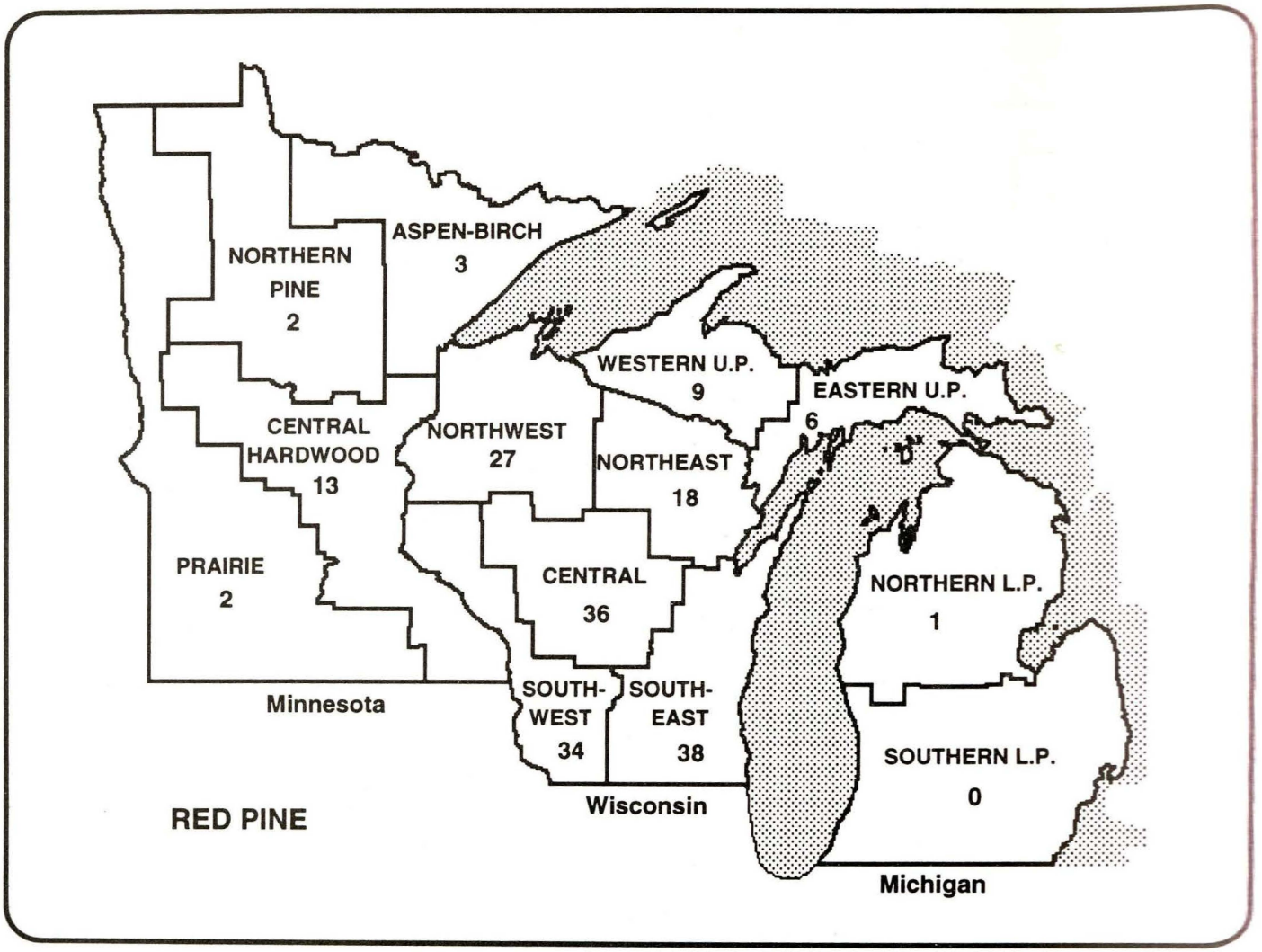
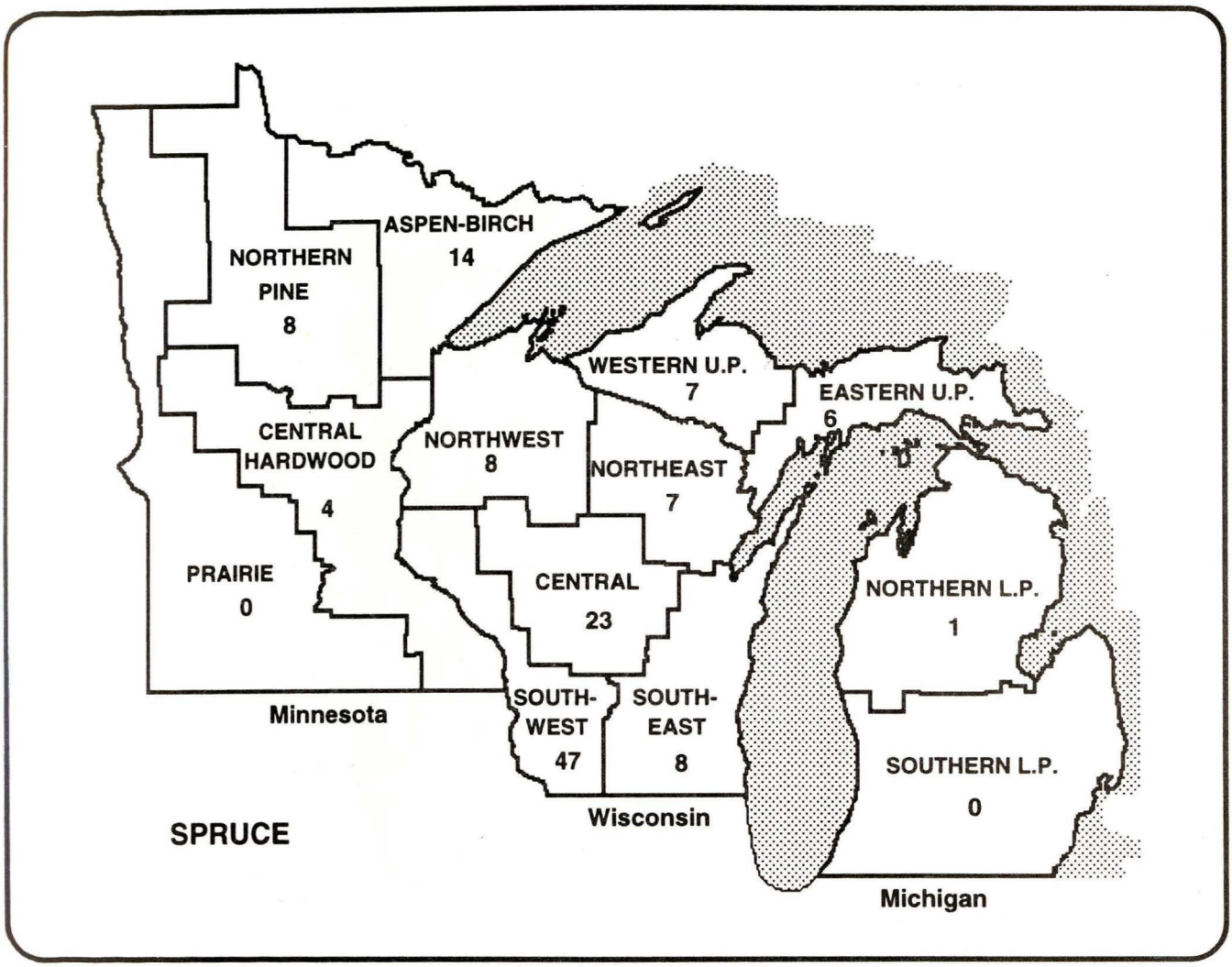
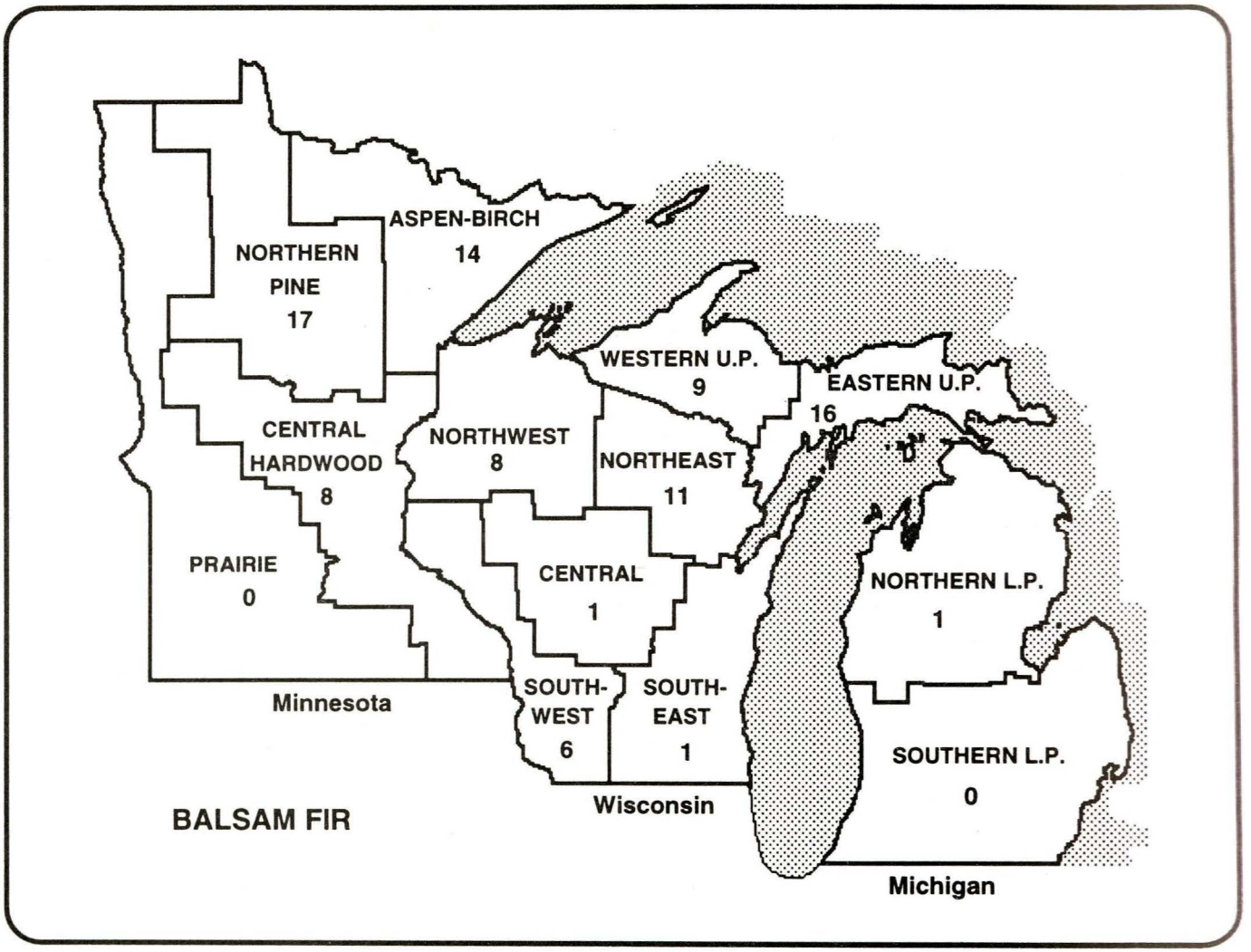
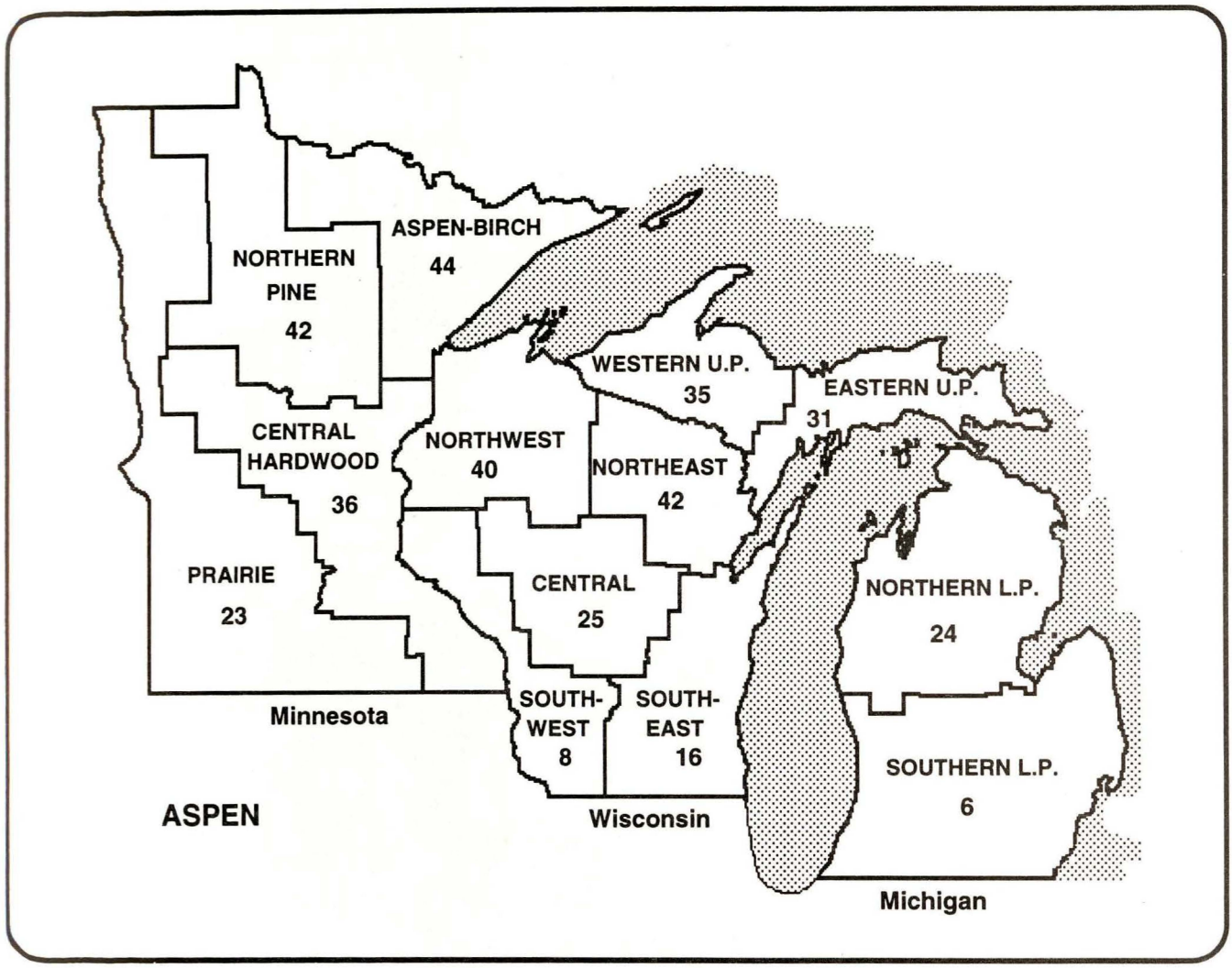


Figure 11.—*Cords of roundwood pulpwood (including chips from roundwood) harvested per 1,000 cords of growing-stock volume for each of five principal pulpwood species by Forest Survey Unit, 1994. Growing-stock volume was determined during the last forest inventory in each State.*


ASPEN-BIRCH
3
NORTHERN
PINE
2
WESTERN U.P.
9
EASTERN U.P.
6
CENTRAL
HARDWOOD
13
NORTHWEST
27
NORTHEAST
18
PRAIRIE
2
CENTRAL
36
NORTHERN L.P.
1
Minnesota
SOUTH-
WEST
34
SOUTH-
EAST
38
SOUTHERN L.P.
0
Wisconsin
RED PINE
Michigan


ASPEN-BIRCH
14
NORTHERN
PINE
8
WESTERN U.P.
7
EASTERN U.P.
6
CENTRAL
HARDWOOD
4
NORTHWEST
8
NORTHEAST
7
PRAIRIE
0
CENTRAL
23
NORTHERN L.P.
1
SOUTH-
WEST
47
SOUTH-
EAST
8
SOUTHERN L.P.
0
Minnesota
Wisconsin
Michigan
SPRUCE


ASPEN-BIRCH
14
NORTHERN
PINE
17
WESTERN U.P.
9
EASTERN U.P.
16
CENTRAL
HARDWOOD
8
NORTHWEST
8
NORTHEAST
11
PRAIRIE
0
CENTRAL
1
NORTHERN L.P.
1
Minnesota
SOUTH-
WEST
6
SOUTH-
EAST
1
SOUTHERN L.P.
0
Wisconsin
BALSAM FIR
Michigan


ASPEN-BIRCH
44
NORTHERN
PINE
42
WESTERN U.P.
35
EASTERN U.P.
31
CENTRAL
HARDWOOD
36
NORTHWEST
40
NORTHEAST
42
PRAIRIE
23
CENTRAL
25
NORTHERN L.P.
24
SOUTH-
WEST
8
SOUTH-
EAST
16
SOUTHERN L.P.
6
Minnesota
Wisconsin
Michigan
ASPEN

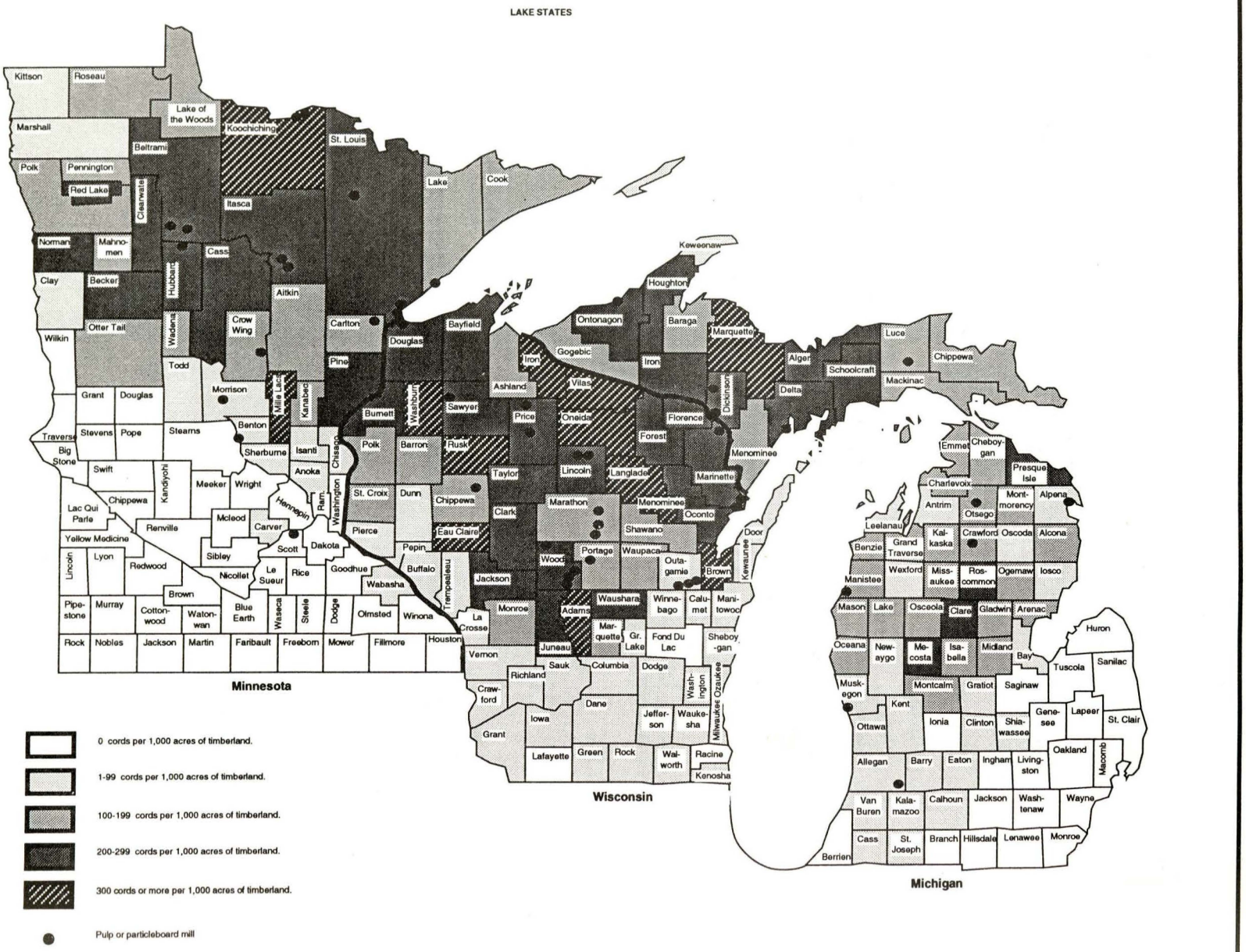

LAKE STATES
Minnesota
Wisconsin
Michigan
0 cords per 1,000 acres of timberland.
1-99 cords per 1,000 acres of timberland.
100-199 cords per 1,000 acres of timberland.
200-299 cords per 1,000 acres of timberland.
300 cords or more per 1,000 acres of timberland.
Pulp or particleboard mill

Figure 12.—*Cords of pulpwood cut per 1,000 acres of timberland in principal pulpwood-producing counties, 1994. Acres of timberland (stocking of trees greater than 16.7 percent) were determined during the last inventory in each State. Locations of active pulp and particleboard mills are shown.*

Pulpwood harvesting was most intensive in the following areas by species: (100,000 cords or more cut)

Species	State	Survey Unit
Jack pine	Michigan	N. Lower Peninsula
	Wisconsin	Central, Northwest
Red pine	Wisconsin	Central
Spruce	Minnesota	Aspen-Birch
Balsam fir	Minnesota	Aspen-Birch
Aspen	Michigan	N. Lower Peninsula, W. Upper Peninsula, E. Upper Peninsula
	Minnesota	Northern Pine, Aspen-Birch, Central Hardwood
	Wisconsin	Northwest, Northeast, Central
White birch	Wisconsin	Northwest, Northeast
Hard maple	Michigan	W. Upper Peninsula, E. Upper Peninsula
	Wisconsin	Northeast, Northwest
Soft maple	Michigan	W. Upper Peninsula, N. Lower Peninsula

RECEIPTS

- In 1994, 34 woodpulp and 14 particleboard mills in the Lake States acquired 10.0 million cords of pulpwood in 1994, up 5 percent from 1993 (fig. 13).
- In 1994, Wisconsin supplied wood to 30 mills, Michigan supplied 30 mills, and Minnesota supplied 27 mills.
- Total imports of roundwood increased by 95 percent, with Canada supplying nearly 100 percent of the volume.
- Softwood residue imported from Canada increased by 45 percent in 1994 to 33 thousand cords. Softwood residue imported from States outside the region increased by 1 percent to 81 thousand cords. The main suppliers of the softwood residue from States outside the Lake States were Montana, South Dakota, and Wyoming.
- Total imports of all wood material increased to 310 thousand cords in 1994, a 46-percent increase from 1993. Canada contributed 55 percent of the total import receipts.

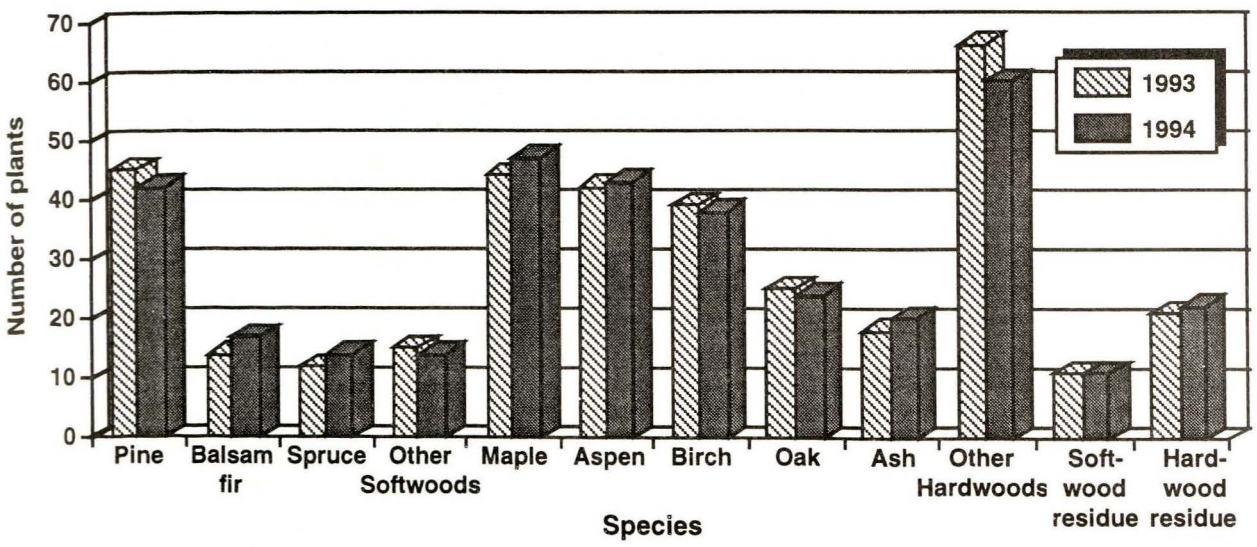


Figure 13.—*Numbers of industrial plants in the Lake States using a particular species or residue for pulping and particleboard, 1993-1994.*

Michigan

- Eleven Michigan mills consumed 3.3 million cords in 1994, up 3 percent from the previous year. Wisconsin provided 71 percent of the imported wood, and Canada provided 21 percent.

Minnesota

- The 16 mills in Minnesota reported consuming an estimated 3.0 million cords in 1994, an increase of 3 percent over 1993. Canada furnished 60 percent of the 188 thousand cords that were imported.

Wisconsin

- The 21 mills in Wisconsin consumed 3.7 million cords in 1994 an increase of 8 percent from 1993. Of that total, 580 thousand cords were supplied by out-of-State sources, an increase of 13 percent from 1993.

INDUSTRY TRENDS AND ANALYSIS

Pulp Mills

In this section pulp mills include wood fiber products such as paper, paperboard, hardboard, insulation board, and medium-density fiber board. All of these products are manufactured from wood that has been reduced to individual fibers, small fiber bundles, or fiber parts that are subsequently formed into a mat.

- Of the 9.7 million cords of pulpwood produced in 1994, 7.0 million cords (72 percent) were used for woodpulp products. Of each cord used to produce pulp, 91 percent was roundwood and 9 percent was residues.

- Principal species harvested for pulp were aspen (2,253 thousand cords), jack pine (681 thousand cords), hard maple (647 thousand cords), soft maple (478 thousand cords), and white birch (442 thousand cords) (fig. 14).

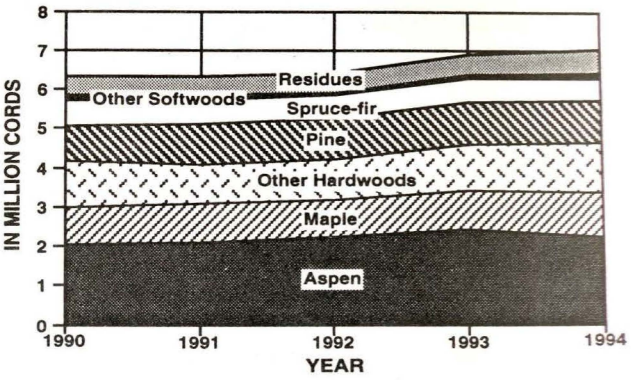


Figure 14.—*Pulpwood production in the Lake States for pulp by species group and residues, 1990-1994.*

- Aspen and other hardwoods were still the mainstays of the pulp mills in the region in 1994, but softwood use has increased steadily since 1988.

- The use of softwood residues increased 72 percent from 1993 while use of hardwood residues increased only 2 percent.

- Average daily woodpulp production was 13.5 thousand tons in 1994 (table 3). That total came from the following type mills:

Type of mill	Average daily woodpulp production (Thousand tons)
Kraft	6.0
Sulfite	0.9
Groundwood mechanical	3.3
Semi-chemical	2.6
Thermo-chemical and thermo-mechanical	0.6

- Lake States pulpwood production for pulp mills in 1990-1994 was:

Species	Production				
	1990	1991	1992	1993	1994
	(Thousand cords)				
Roundwood					
Aspen	2,029	2,095	2,184	2,427	2,253
Softwoods	1,677	1,718	1,702	1,780	1,790
Other species	2,070	1,948	2,041	2,113	2,351
Residue	450	506	471	514	594
Total	6,226	6,267	6,398	6,834	6,989

Michigan

- Pulpwood production for wood fiber was 2.3 million cords in 1994. Aspen was the major pulpwood species harvested in the State with 553 thousand cords, a 1-percent decrease from 1993.

- Michigan mills imported 217 thousand cords of pulpwood for processing: 181 thousand cords from Wisconsin, 11 thousand cords from Minnesota, and 25 thousand cords from Indiana and Canada combined. Michigan exported 305 thousand cords to Minnesota and Wisconsin, and 11 thousand cords to Canada.

- Michigan mills used 1,848 thousand cords of hardwood material in 1994, an increase of 4 percent from 1993. The use of softwood material in 1994 decreased by 3 percent to 467 thousand cords.

Minnesota

- Pulpwood production for woodpulp products totaled 1.8 million cords in 1994. Aspen was the predominant species harvested in the State with 963 thousand cords, an 8-percent decrease from 1993.

- Mills in Minnesota imported 166 thousand cords for pulp products: 17 thousand cords from Michigan, 55 thousand cords from Wisconsin, and 94 thousand cords from Canada. Minnesota exported 101 thousand cords to Wisconsin, 11 thousand cords to Michigan, and 41 thousand cords to Canada.

- In 1994, Minnesota mills had a 197-percent increase in the use of softwood residues from 1993, a 2-percent decrease for hardwood roundwood, a 5-percent decrease for softwood roundwood, and a 9-percent decrease for hardwood residues.

Wisconsin

- Pulpwood production for woodpulp products totaled 2.9 million cords in 1994. Aspen was the main species harvested with 736 thousand cords, a 10-percent decrease from 1993.

- Wisconsin mills imported 498 thousand cords of pulpwood: 298 thousand cords from Michigan, 101 thousand cords from Minnesota, 47 thousand cords from the Plains States, 34 thousand cords from Western States, and 18 thousand cords from Canada. Wisconsin exported 181 thousand cords to Michigan, 55 thousand cords to Minnesota, and 2 thousand cords to the Central States.

- The use of softwoods in Wisconsin mills increased by 6 percent, and use of hardwoods increased by 2 percent.

Outlook

- While U.S. paper and paperboard production increased 5 percent during 1994, the Lake States production of market pulpwood for woodpulp mills increased only 3 percent.

- Total output of paper and paperboard in the U.S. in 1994 was 89 million tons (43 million tons of paper and 46 million tons of paperboard). The Lake States output of paper and paperboard in 1994 was approximately 7 million tons or 8 percent of the U.S. total.

- Pulpwood consumption in the U.S. in 1994 totaled 106 million cords, a 1-percent increase from 1993. Pulpwood consumption in the Lake States was 7 percent of that total.

Particleboard Mills

Particleboard is a generic term for a panel manufactured from lignocellulosic material—commonly wood—essentially in the form of particles (as distinct from fibers). These fibers are bonded together with synthetic resin or other suitable binder, under heat and pressure, by a process wherein the interparticle bonds are created wholly by the added binder and to which other materials may have been added during manufacture to improve certain properties. The many types of particleboard differ greatly in regard to size and geometry of the particle, the amount of resin (adhesive) used, and the density to which the panel is pressed. The major types of particles used for particleboard are: shavings, flakes, wafers, chips, sawdust, strands, slivers, and wood wool (excelsior). Most particleboard in the U.S. is made from residues (shavings, sawdust, or chips), but some types require that roundwood (saw logs or pulpwood) be used. Wafer board is an example of a product for which particles must be cut from solid wood. A new product called engineered lumber was added to this generic term in 1992.

- The Lake States produced 2.8 million cords of pulpwood in 1994 for particleboard products, up 8 percent from 1993. For every cord of pulpwood used in particleboard manufacture, 94 percent came from roundwood and 6 percent was residues from wood-using plants (sawmills, veneer mills, etc.).

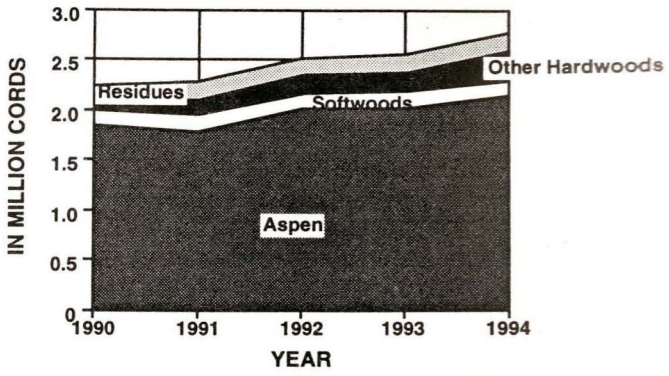


Figure 15.—*Pulpwood production for particleboard in the Lake States, 1990-1994.*

- Principal species harvested for particleboard products were aspen (2,146 thousand cords), jack pine (130 thousand cords), soft maple (95 thousand cords), and balsam poplar (71 thousand cords) (fig. 15).

- Total softwood roundwood used for particleboard products decreased from 152 thousand cords in 1993 to 149 thousand cords in 1994, a decrease of 2 percent. Softwood residue use decreased 4 percent—from 78 thousand cords in 1993 to 74 thousand cords in 1994.

- The use of hardwood roundwood increased from 2,232 thousand cords in 1993 to 2,449 thousand cords in 1994, an increase of 10 percent. Hardwood residue use decreased by 11 percent—from 98 thousand cords in 1993 to 87 thousand cords in 1994.

- Annual production capacity of the Lake States particleboard and engineered lumber product plants is:

Particleboard and panel: Company and product	Location	Production capacity (Million square feet 3/4-inch basis)
Georgia-Pacific - Particleboard	Gaylord, MI	300
Louisiana-Pacific - OSB*	Newberry, MI	61
Louisiana-Pacific - OSB*	Sagola, MI	180
Weyerhaeuser Co. - OSB*	Grayling, MI	180
Louisiana-Pacific - OSB*	Two Harbors, MN	61
Potlatch Corp. - OSB*	Grand Rapids, MN	170
Northwood Panelboard Co. - OSB*	Solway, MN	160
Potlatch Corp. - OSB*	Bemidji, MN	240
Potlatch Corp. - OSB*	Cook, MN	120
Louisiana-Pacific - Waferboard	Hayward, WI	230
Rodman Industries - Particleboard	Marinette, WI	15
Louisiana-Pacific - OSB*	Tomahawk, WI	208
Weyerhaeuser Co. - Particleboard	Marshfield, WI	190
All particleboard companies		2,115

Engineered lumber: Company	Location	Production capacity (Thousand cubic feet)
Trus-Joist McMillian - PSL**	Deerwood, MN	3,850

* Oriented strand board ** Parallel strand lumber

- Lake States pulpwood production for particleboard mills in 1990-1994 was:

Species	Production				
	1990	1991	1992	1993	1994
	(Thousand cords)				
Roundwood					
Softwoods	140	158	157	152	149
Aspen	1,840	1,786	2,050	2,028	2,146
Other hardwoods	103	148	183	204	303
Residue	126	194	142	175	161
Total	2,209	2,286	2,532	2,559	2,759

- National housing starts increased almost 13 percent in 1994 to 1.45 million units. The continued growing economy and low mortgage rates contributed to the 8-percent increase in Lakes States pulpwood production for particleboard products.

Michigan

- Pulpwood harvested for particleboard products totaled 851 thousand cords in 1994, of which aspen totaled 531 thousand cords. Residues used for particleboard products added another 87 thousand cords.

- The particleboard mills in Michigan imported 52 thousand cords of aspen from Wisconsin and 48 thousand cords from Canada. Raw materials exported for particleboard production amounted to 12 thousand cords.

Minnesota

- Timber logged for particleboard products totaled 1.3 million cords (49 percent of the Lake States total). The predominant species cut was aspen with 1.2 million cords, or 95 percent of the total.

- The particleboard mills in Minnesota imported 19,700 cords from Canada and 2,500 cords from the Plains States. In 1994, raw materials exported from the State for particleboard manufacturing totaled 62 thousand cords.

Wisconsin

- Wisconsin produced 485 thousand cords of roundwood for particleboard manufacturing. The main species harvested was aspen with 423 thousand cords, or 87 percent of the total.

- The mills in Wisconsin imported 82 thousand cords of wood for particleboard manufacturing: 62 thousand cords from Minnesota, 12 thousand cords from Michigan, and 8 thousand cords from Canada. Wisconsin exported 60 thousand cords to Michigan particleboard mills in 1994.

New Mills and Expansions

Major pulp mill expansion and new construction are as follows:

- Appleton Papers Inc., Combined Locks, Wisconsin expansion was completed in 1994.

- Aspen Bay Pulp and Fibre, a bleached chemical thermo-mechanical pulp mill, is being built in Menominee, Michigan and should be finished by late 1997.

- Georgia-Pacific Flakeboard Limited has completed construction of a medium density fiberboard (MDF) operation in Sault Ste. Marie, Ontario, Canada. The plant began operation early in 1996.

- Potlatch Corp. Cloquet, Minnesota, is rebuilding the bleached kraft pulp mill, doubling its capacity by 1999.

- Potlatch Corp. Cook, Minnesota, has been permitted to double the capacity of its oriented strand board (OSB) mill; construction could be complete by 1998.

CENTRAL STATES

PRODUCTION

- Pulpwood production in the Central States (Illinois, Indiana, Iowa, and Missouri) increased 16 percent—from 288 thousand cords in 1993 to 333 thousand cords in 1994 (fig. 16).

- The flooding of 1993 contributed to a 19-percent decrease in pulpwood production from 1992. Although pulpwood production in 1994 rebounded from the depressed 1993 levels, pulpwood production in 1994 was still 6 percent below that of 1992. Missouri was still 24 percent below the 1992 production level, Illinois and Indiana were 2 percent below, but Iowa was 78 percent above the 1992 pulpwood production level.

- Hardwood residue from primary wood-using mills made up 70 percent of total production. Softwood residue from primary wood-using mills increased by 18 percent from 1993.

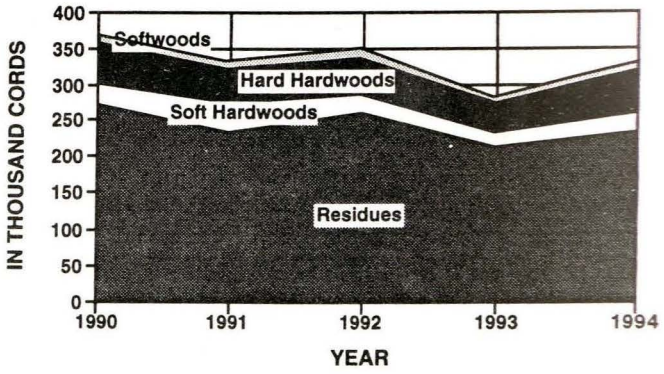


Figure 16.—*Pulpwood production in the Central States, 1990-1994.*

- Central States production for roundwood pulpwood was 96 thousand cords in 1994, up 36 percent from 1993. Pulpwood production from soft hardwood[7] roundwood rose from 22 thousand cords in 1993 to 29 thousand cords in 1994 or 33 percent. Hard hardwood[8] production also increased from 41 thousand cords in 1993 to 58 thousand cords in 1994 or 40 percent.

[7]*Hardwood species with an average specific gravity of 0.50 or less.*

[8]*Hardwood species with an average specific gravity greater than 0.50.*

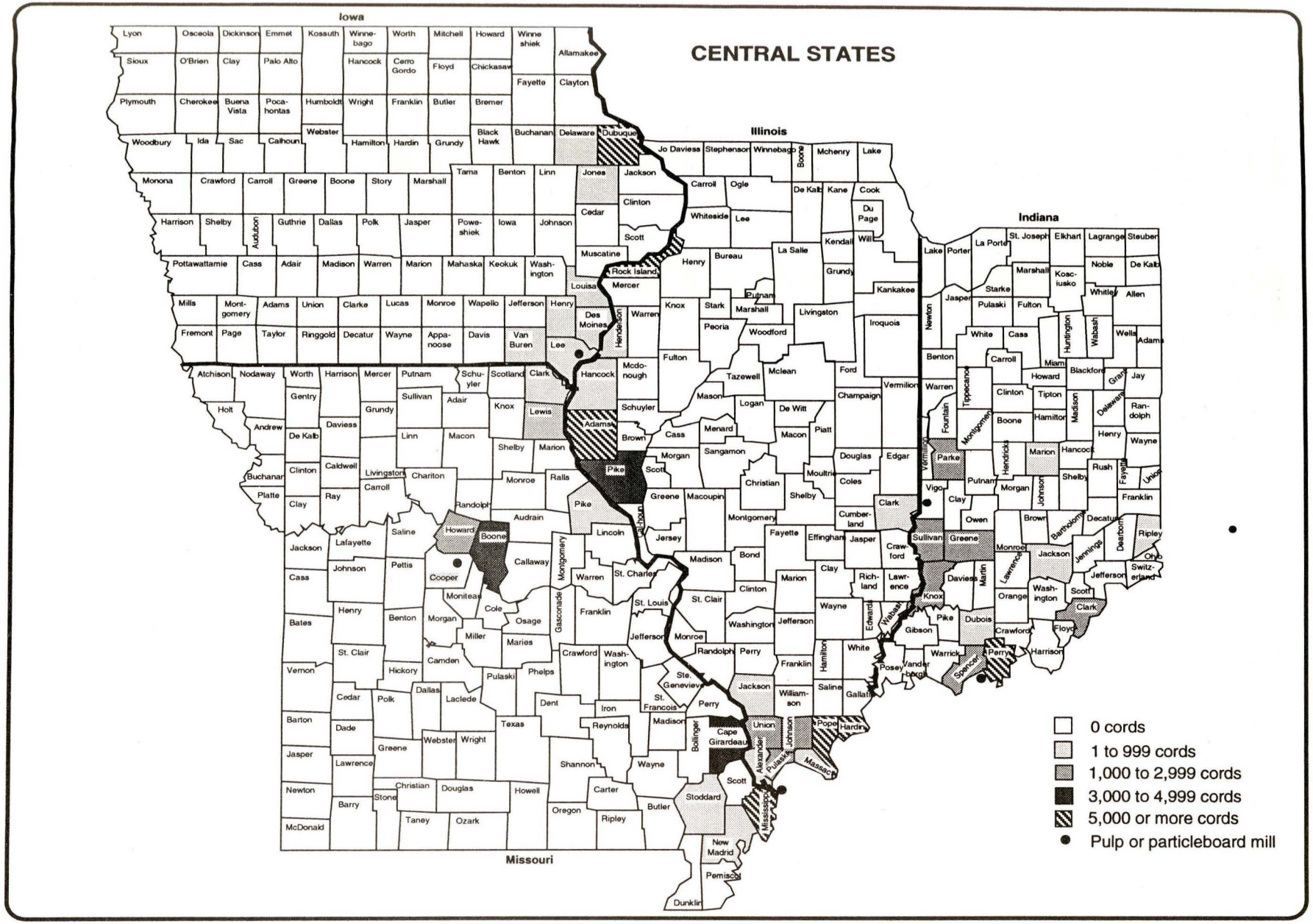


Figure 17.—*Production of pulpwood from roundwood (including chips from roundwood) in the Central States by counties, in standard cords, 1994. Locations of Central States and nearby pulp mills using Central States pulpwood are shown.*

- Exports of roundwood and residues from the Central States in 1994 increased by 40 percent to 208 thousand cords. Central States pulpwood was shipped to Kentucky, Wisconsin, Ohio, and Michigan mills.

- Loggers harvested pulpwood in 14 counties of Illinois; 11 counties in southern Indiana; 8 counties in eastern Iowa; and 9 counties in northeast, central, and southeast Missouri (fig. 17 on previous page).

- Whole-tree chips made up 10 percent of the pulpwood production in the Central States in 1994. The 32 thousand cords of whole-tree chips were a 46-percent increase from the 1993 volume.

Illinois

- Illinois produced 76 thousand cords of pulpwood in 1994, up 39 percent from 1993. Illinois contributed 23 percent of the total production in the Central States in 1994 (fig. 18).

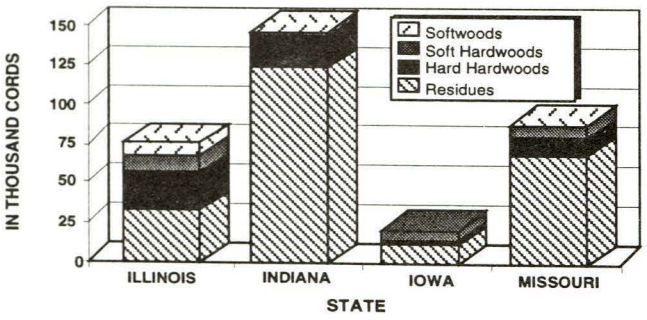


Figure 18.—*Central States pulpwood production by species group and residues, 1994.*

- Illinois does not have any primary woodpulp mills; consequently, all pulpwood harvested is shipped to plants outside the State.

Indiana

- Pulpwood production in Indiana accounted for 44 percent of the total pulpwood harvested in the Central States in 1994, or 147 thousand cords, a 3-percent increase from 1993.

- Pulpwood shipped to mills outside the north-central region totaled 80 thousand cords, 55 percent of the State's total pulpwood production. The remaining 45 percent was used by mills in the Central and Lakes States.

Iowa

- The total pulpwood production in 1994 was 22 thousand cords, 7 percent of the region's total.

- Hardwood residues accounted for 53 percent of Iowa's pulpwood production in 1994, soft hardwood roundwood accounted for 33 percent, and hard hardwood roundwood accounted for 13 percent.

- Production of soft hardwood and hard hardwood pulpwood in 1994 increased by 72 percent and 71 percent, respectively, from 1993. Hardwood residues also increased by 73 percent.

Missouri

- Missouri was the second largest producer of pulpwood in the Central States in 1994 at 88 thousand cords or 26 percent of the region's total. Missouri pulpwood production increased by 14 percent from 1993.

- In 1994 Missouri exported 69 thousand cords or 79 percent of the State's pulpwood production to mills outside the region.

RECEIPTS

- Pulp mills in the region received 127 thousand cords in 1994, up 28 percent from 1993.

- Hardwood residue receipts increased by 20 percent, from 71 thousand cords in 1993 to 86 thousand cords in 1994.

- No softwoods were used for pulpwood for the 11th consecutive year in the Central States.

INDUSTRY TRENDS

- Average daily woodpulp production increased by 2 percent in 1994 to 826 tons (table 5).

- Mills in the adjacent States remained the dominant market for Central States pulpwood in 1994.

- Hardwood residue from sawmills continued to be the dominant form of pulpwood procured for Central States pulp mills.

PLAINS STATES

PRODUCTION AND RECEIPTS

- Pulpwood production in the Plains States was 111 thousand cords in 1994, a decrease of 3 percent from 1993, and came from South Dakota and Kansas (fig. 19).

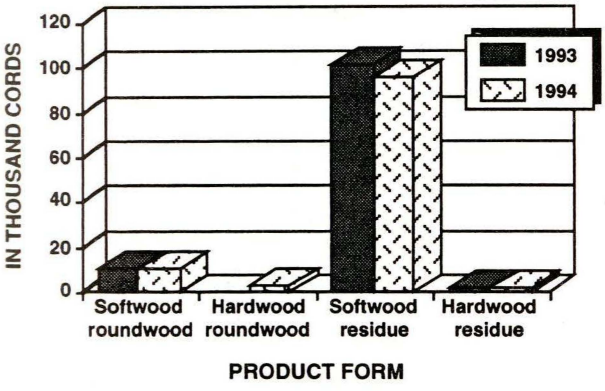


Figure 19.—*Pulpwood production in the Plains States, 1993-1994.*

- Softwood residues accounted for 86 percent of the pulpwood production in the Plains States in 1994, all of which came from South Dakota (fig. 20).

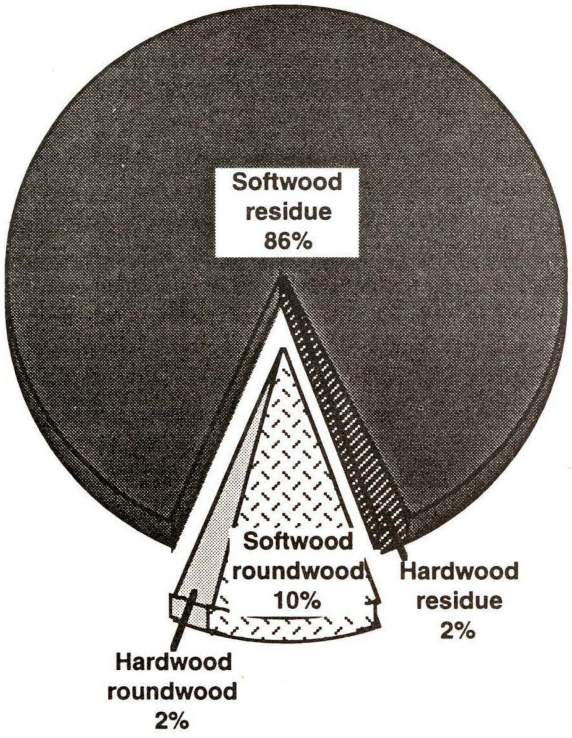


Figure 20.—*Plains States pulpwood production, 1994.*

- Forty-seven thousand cords of softwood residue from the Plains States were exported to Wisconsin in 1994. An additional 2 thousand cords of hardwood residues were sent to Oklahoma.

- The Plains States imported 58 thousand cords of softwood residue from Wyoming in 1994.

- All of the pulpwood received in the Plains States was processed at Merillat Industries, Inc. (particleboard), in Rapid City, South Dakota, which has a production capacity of 95 million square feet 3/4 inch basis.

APPENDIX

Conversion Factors Used in the North-Central Region

Standard cords of green roundwood per green ton:

Species	Factor	Species	Factor
Softwoods	0.4688	White birch	0.4018
N. white cedar	.6329	Yellow birch	.3723
Balsam fir	.4688	River birch	.3871
Hemlock	.4150	Sweetgum	.3669
Jack pine	.4688	Yellow-poplar	.4219
Red pine	.4688	Blackgum	.3779
White pine	.4777	Sycamore	.4083
Shortleaf pine	.3956	Cottonwood	.4291
Spruce	.5014	Elm	.4018
Tamarack	.4291	Hickory	.3701
Hardwoods	.3939	Hard maple	.3617
Soft hardwoods	.4171	Soft maple	.4083
Hard hardwoods	.3708	Black cherry	.4688
Ash	.4330	Red oak	.3444
Aspen	.4291	White oak	.3723
Balsam poplar	.4083	Black oak	.3444
Basswood	.5167	Other hardwoods	.4777
Beech	.3956		

Table 2. -- Number of industrial plants in the Lake States using a particular species group or residue for pulping or particleboard in 1994

Product form and species group	Total Lake States	State		
		Michigan	Minnesota	Wisconsin
Roundwood				
Softwoods				
Northern white-cedar	2	2	-	-
Balsam fir	16	3	4	9
Hemlock	6	1	-	5
Jack pine	18	4	7	7
Red pine	15	3	5	7
White pine	9	2	-	7
Spruce	13	2	4	7
Tamarack	6	1	1	4
Total plants using softwood roundwood[1]	24	4	10	10
Hardwoods				
Ash	20	8	1	11
Aspen	42	10	15	17
Balsam poplar	17	7	8	2
Basswood	18	8	1	9
Beech	8	7	-	1
White birch	27	9	6	12
Yellow birch	11	5	-	6
Cottonwood	2	1	-	1
Elm	5	2	-	3
Hickory	1	1	-	-
Hard maple	22	9	1	12
Soft maple	25	10	2	13
Red oak	16	8	1	7
White oak	8	4	-	4
Other hardwoods	9	4	-	5
Total plants using hardwood roundwood[1]	46	11	15	20
Total plants using roundwood[1]	47	11	16	20
Residues				
Softwood	10	2	2	6
Hardwood	20	7	4	9
Total plants using residues[1]	21	7	5	9
Total plants[1]	48	11	16	21

[1] Some plants use more than one species, so numbers in columns are not additive.

Table 3. -- Average daily production of active woodpulp mills in the Lake States by mill, location, and type of pulp produced, 1994

(In tons per 24 hours)

Company	Location	All types	Type of pulp					
			Sulfite	Kraft	Groundwood/ mechanical	Semi-chemical	Thermo-chemical	Thermo-mechanical
Michigan								
ABT Co.	Alpena	400	-	-	400	-	-	-
Champion International Corp.	Quinnesec	845	-	845	-	-	-	-
Mead Corp.	Escanaba	1,500	-	1,500	-	-	-	-
Menasha Corp.	Otsego	320	-	-	-	320	-	-
Packaging Corp. of America	Manistee	600	-	-	-	600	-	-
S. D. Warren Co.	Muskegon	250	-	250	-	-	-	-
Stone Container Corp.	Ontonagon	520	-	-	-	520	-	-
Total	7 mills	4,435	-	2,595	400	1,440	-	-
Minnesota							-	-
Blandin Paper Co.	Grand Rapids	550	-	-	550	-	-	-
Boise Cascade Corp.	International Falls	970	-	970	-	-	-	-
Certain-Teed Corp.	Shakepee	100	-	-	-	-	100	-
Georgia-Pacific Corp.	Bemidji	100	-	-	100	-	-	-
Georgia-Pacific Corp.	Duluth	350	-	-	350	-	-	-
Hennepin Paper Co.	Little Falls	60	-	-	60	-	-	-
International Bildrite, Inc.	International Falls	110	-	-	110	-	-	-
Lake Superior Paper Industry	Duluth	440	-	-	440	-	-	-
Potlatch Corp.	Cloquet	520	-	520	-	-	-	-
Champion International Corp.	Sartell	370	-	-	-	-	-	370
Total	10 mills	3,570	-	1,490	1,610	-	100	370
Wisconsin								
Appleton Papers Inc.	Combined Locks	200	-	-	-	200	-	-
Badger Paper Mills Inc.	Peshtigo	110	110	-	-	-	-	-
Consolidated Paper Inc.	Stevens Point	94	-	-	94	-	-	-
Consolidated Paper Inc.	Wisconsin Rapids	1,361	-	843	518	-	-	-
Cross Pointe Paper Corp.	Park Falls	120	120	-	-	-	-	-
Georgia-Pacific Corp.	Phillips	150	-	-	150	-	-	-
Georgia-Pacific Corp.	Superior	140	-	-	140	-	-	-
Georgia-Pacific Corp.	Port Edwards	260	260	-	-	-	-	-
Georgia-Pacific Corp.	Nekoosa	380	-	380	-	-	-	-
Globe Building Materials Inc.	Cornell	100	-	-	-	-	-	100
Mosinee Paper Corp.	Mosinee	285	-	285	-	-	-	-
Niagara of WI Paper Corp.	Niagara	280	-	-	280	-	-	-
Packaging Corp. of America	Tomahawk	1,000	-	-	-	1,000	-	-
Repap Wisconsin Inc.	Kimberly	125	-	-	125	-	-	-
Thilmany-International Paper	Kaukauna	450	-	450	-	-	-	-
Wausau Paper Mills Corp.	Brokaw	265	265	-	-	-	-	-
Weyerhaeuser Paper Co.	Rothschild	140	140	-	-	-	-	-
Total	17 mills	5,460	895	1,958	1,307	1,200	-	100
Lake States total	34 mills	13,465	895	6,043	3,317	2,640	100	470

Table 4. -- Production and imports of pulpwood, Central States and Plain States, 1994[1]

(In standard cords, unpeeled)

Product form, major species group, and destination	Production by State[2]						Imports			
	Illinois	Indiana	Iowa	Missouri	Plains States[3]	Regional Total	Lake States	Other U.S.[4]	Total imports	Total receipts
Roundwood										
Softwoods										
Northeastern States	8,276	667	-	104	-	9,047	-	-	-	-
Plain States	-	-	-	-	10,800	10,800	-	-	-	10,800
Total	8,276	667	-	104	10,800	19,847	-	-	-	10,800
Soft hardwoods										
Central States	8,292	2,362	7,164	7,397	-	25,215	-	-	-	25,215
Lake States	-	-	-	-	2,500	2,500	-	-	-	-
Northeastern States	2,575	-	-	1,282	-	3,857	-	-	-	-
Total	10,867	2,362	7,164	8,679	2,500	31,572	-	-	-	25,215
Hard hardwoods										
Central States	4,107	8,753	3,134	505	-	16,498	-	-	-	16,498
Northeastern States	19,883	11,289	-	9,997	-	41,170	-	-	-	-
Total	23,990	20,042	3,134	10,502	-	57,668	-	-	-	16,498
Total all roundwood										
Central States	12,398	11,115	10,298	7,902	-	41,713	-	-	-	41,713
Lake States	-	-	-	-	2,500	2,500	-	-	-	-
Northeastern States	30,735	11,956	-	11,383	-	54,074	-	-	-	-
Plain States	-	-	-	-	10,800	10,800	-	-	-	10,800
Total	43,134	23,071	10,298	19,284	13,300	109,087	-	-	-	52,513
Residues										
Softwoods										
Lake States	-	-	-	-	46,503	46,503	-	-	-	-
Northeastern States	-	21	-	4,516	-	4,537	-	-	-	-
Plain States	-	-	-	-	48,839	48,839	-	58,000	58,000	106,839
Total	-	21	-	4,516	95,342	99,879	-	58,000	58,000	106,839
Hardwoods										
Central States	20,753	40,048	11,435	10,952	-	83,188	2,318	-	2,318	85,506
Lake States	18	15,594	182	-	-	15,794	-	-	-	-
Northeastern States	11,908	68,232	-	53,450	-	133,590	-	-	-	-
Southern States	-	-	-	-	2,193	2,193	-	-	-	-
Total	32,679	123,874	11,617	64,402	2,193	234,766	2,318	-	2,318	85,506
Total all residue										
Central States	20,753	40,048	11,435	10,952	-	83,188	2,318	-	2,318	85,506
Lake States	18	15,594	182	-	46,503	62,297	-	-	-	-
Northeastern States	11,908	68,253	-	57,965	-	138,127	-	-	-	-
Plain States	-	-	-	-	48,839	48,839	-	58,000	58,000	106,839
Southern States	-	-	-	-	2,193	2,193	-	-	-	-
Total	32,679	123,895	11,617	68,917	97,536	334,645	2,318	58,000	60,318	192,346
All wood material										
Central States	33,152	51,163	21,734	18,854	-	124,902	2,318	-	2,318	127,220
Lake States	18	15,594	182	-	49,003	64,797	-	-	-	-
Northeastern States	42,643	80,209	-	69,348	-	192,201	-	-	-	-
Plain States	-	-	-	-	59,639	59,639	-	58,000	58,000	117,639
Southern States	-	-	-	-	2,193	2,193	-	-	-	-
Total	75,813	146,966	21,916	88,202	110,836	443,732	2,318	58,000	60,318	244,859

[1] Table may not add due to rounding.

[2] Vertical columns of figures under the box heading "Production by State" present the amount of roundwood cut or residue generated in each State.

[3] Includes Kansas, Nebraska, South Dakota, and North Dakota.

[4] Includes Canadian imports, if any.

Table 5. -- Average daily production of active woodpulp mills in the Central States by mill, location, and type of pulp produced,1993

(In tons per 24 hours)

Company	Location	All types	Groundwood/ mechanical	Semi-chemical
The Weston Paper and Mfg. Co.	Terre Haute, Indiana	550	--	550
Four M Paper Corp.	Fort Madison, Iowa	201	--	201
Huebert Fiberboard, Inc.	Boonville, Missouri	75	75	--
Central States total	3 mills	826	75	751

Table 6. -- Lake States pulpwood production by State of origin and destination, 1990-1994

(In thousand cords, unpeeled)[1]

MICHIGAN

Year	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other
1990	2,982	2,645	1	313	23
1991	3,016	2,687	5	304	20
1992	2,877	2,533	3	323	18
1993	3,154	2,859	11	272	13
1994	3,254	2,915	17	310	11
5-year average	3,057	2,728	7	304	17

MINNESOTA

Year	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other
1990	2,361	1	2,200	127	33
1991	2,391	-	2,269	101	21
1992	2,672	-	2,520	105	47
1993	2,969	-	2,783	146	39
1994	3,029	11	2,812	164	41
5-year average	2,684	2	2,517	129	36

WISCONSIN

Year	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other
1990	3,094	243	83	2,768	-
1991	3,146	274	69	2,799	4
1992	3,296	253	56	2,987	-
1993	3,270	244	55	2,970	1
1994	3,465	241	55	3,167	2
5-year average	3,254	251	64	2,938	1

[1] Includes mill residues used for pulp.

Table 7. -- Lake States pulpwood production by Forest Survey Unit and destination by State, 1994

(In thousand standard cords, unpeeled)

MICHIGAN

Product form and Forest Survey Unit	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other
Roundwood					
Eastern Upper Peninsula	773	693	-	72	8
Western Upper Peninsula	1,140	919	17	202	2
Northern Lower Peninsula	1,035	1,022	-	11	2
Southern Lower Peninsula	65	65	-	(1/)	-
Total	3,013	2,699	17	285	11
Residues	241	216	-	24	-
Total pulpwood	3,254	2,915	17	310	11

MINNESOTA

Product form and Forest Survey Unit	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other
Roundwood					
Aspen-Birch	1,318	5	1,187	99	27
Northern Pine	1,283	6	1,252	24	-
Central Hardwood	222	(1/)	183	40	-
Prairie	35	-	35	-	-
Total	2,858	11	2,657	163	27
Residues	170	-	155	1	15
Total pulpwood	3,029	11	2,812	164	41

WISCONSIN

Product form and Forest Survey Unit	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other
Roundwood					
Northeast	1,066	168	(1/)	898	-
Northwest	1,312	32	53	1,227	-
Central	640	-	-	640	-
Southwest	65	-	(1/)	65	-
Southeast	38	16	-	22	-
Total	3,121	215	54	2,852	-
Residues	344	26	1	315	2
Total pulpwood	3,465	241	55	3,167	2

(1/) Less than 500 standard cords, unpeeled.

Table 8. -- Lake States annual pulpwood production from roundwood by species group, State, and Forest Survey Unit, 1990-1994

(In thousand standard cords, unpeeled)

Forest Survey Unit	All species					Pine					Spruce				
	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994
MICHIGAN															
Eastern Upper Peninsula	747	760	720	778	773	99	109	128	149	111	29	22	26	27	23
Western Upper Peninsula	990	1,045	1,101	1,051	1,140	87	88	125	115	101	36	40	43	39	38
Northern Lower Peninsula	935	923	788	1	1,035	113	112	110	116	132	1	1	1	2	1
Southern Lower Peninsula	46	35	39	64	65	(1/)	(1/)	(1/)	(1/)	(1/)	-	-	-	-	-
Total	2,717	2,763	2,649	2,909	3,013	300	309	363	380	344	66	64	70	67	62
MINNESOTA															
Aspen-Birch	1,014	979	1,129	1,330	1,318	58	55	49	56	46	137	110	115	125	137
Northern Pine	1,152	1,209	1,299	1,341	1,283	76	98	68	81	60	43	31	30	33	29
Central Hardwood	106	106	136	163	222	4	10	20	20	14	(1/)	1	1	1	1
Prairie	4	12	20	23	35	(1/)	-	(1/)	(1/)	-	-	-	-	-	-
Total	2,277	2,306	2,585	2,857	2,858	137	164	136	156	120	180	141	146	158	165
WISCONSIN															
Northeast	1,075	1,055	1,117	1,054	1,066	152	145	142	141	135	32	17	18	13	12
Northwest	1,127	1,097	1,201	1,221	1,312	162	211	204	225	242	16	15	20	19	16
Central	595	550	574	575	640	261	277	276	277	307	1	1	2	1	1
Southwest	53	63	81	58	65	34	50	47	34	38	(1/)	(1/)	1	1	1
Southeast	16	20	35	30	38	10	13	26	15	15	(1/)	(1/)	1	(1/)	1
Total	2,866	2,784	3,008	2,937	3,121	620	695	695	692	738	49	33	51	34	31
Total Lake States	7,860	7,853	8,242	8,703	8,992	1,057	1,168	1,195	1,228	1,201	294	237	257	259	258

(Table 8 continued on next page.)

(Table 8 continued.)

Forest Survey Unit	Balsam fir					Other softwoods					Aspen				
	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994
MICHIGAN															
Eastern Upper Peninsula	51	63	44	55	55	40	27	26	25	43	220	210	200	211	181
Western Upper Peninsula	33	37	36	44	45	29	26	24	24	41	369	368	367	373	360
Northern Lower Peninsula	2	3	3	3	2	2	(1/)	(1/)	(1/)	(1/)	515	510	460	545	527
Southern Lower Peninsula	-	-	-	-	-	-	-	-	-	(1/)	12	6	7	13	16
Total	86	103	83	101	103	71	63	50	49	84	1,115	1,093	1,033	1,142	1,084
MINNESOTA															
Aspen-Birch	117	106	104	114	114	7	3	1	2	2	632	643	782	925	862
Northern Pine	81	90	81	84	70	2	1	1	1	1	928	959	1,073	1,105	1,061
Central Hardwood	(1/)	(1/)	2	2	1	-	(1/)	-	-	-	94	84	110	131	197
Prairie	-	-	-	11	-	-	-	-	-	-	4	12	20	23	35
Total	197	197	187	199	185	9	4	1	3	3	1,658	1,698	1,985	2,185	2,155
WISCONSIN															
Northeast	37	31	29	30	31	36	29	24	20	32	409	414	452	405	393
Northwest	27	33	32	31	31	8	9	8	9	9	520	513	554	544	573
Central	1	(1/)	(1/)	1	(1/)	2	2	2	2	2	151	149	175	152	163
Southwest	(1/)	-	(1/)	(1/)	(1/)	(1/)	-	(1/)	(1/)	-	15	11	29	18	17
Southeast	(1/)	(1/)	(1/)	(1/)	(1/)	(1/)	(1/)	(1/)	(1/)	(1/)	2	3	6	10	13
Total	66	64	61	61	63	47	40	34	31	42	1,096	1,090	1,216	1,129	1,159
Total Lake States	349	364	331	361	351	126	106	85	83	129	3,869	3,881	4,234	4,455	4,399

(Table 8 continued on next page.)

(Table 8 continued.)

Forest Survey Unit	Birch					Maple					Other hardwoods				
	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994
MICHIGAN															
Eastern Upper Peninsula	82	66	61	64	75	136	180	156	193	215	90	66	79	55	71
Western Upper Peninsula	103	82	86	81	87	231	306	312	280	351	102	85	108	95	117
Northern Lower Peninsula	43	41	35	51	50	126	137	111	143	163	133	110	69	156	160
Southern Lower Peninsula	(1/)	(1/)	(1/)	2	1	7	6	8	14	8	27	23	25	36	40
Total	228	188	183	197	213	500	630	586	630	736	351	284	281	342	387
MINNESOTA															
Aspen-Birch	21	10	18	27	44	9	7	4	11	10	35	45	57	72	103
Northern Pine	1	2	6	11	30	7	9	6	7	10	14	19	33	20	23
Central Hardwood	1	1	1	3	1	4	5	2	4	6	4	5	2	2	2
Prairie	-	-	-	-	-	-	-	-	-	-	-	(1/)	(1/)	(1/)	-
Total	23	14	25	42	75	20	20	12	21	26	53	70	92	94	128
WISCONSIN															
Northeast	136	137	146	129	116	192	183	191	209	226	80	75	115	107	121
Northwest	149	104	134	114	126	172	133	150	170	205	74	54	100	108	110
Central	45	27	25	17	18	86	59	55	49	60	47	25	38	77	89
Southwest	1	1	1	1	1	3	1	2	2	4	2	(1/)	1	2	5
Southeast	(1/)	(1/)	(1/)	(1/)	1	2	2	1	2	2	1	(1/)	1	3	5
Total	331	268	307	261	263	454	378	399	431	496	204	155	255	298	329
Total Lake States	582	470	515	500	550	974	1,028	997	1,083	1,259	608	509	628	734	845

1/ Less than 500 cords.

Table 9. -- Pulpwood production from roundwood by county and species group, Michigan, 1994

(In standard cords, unpeeled)

Forest Survey Unit and county[1]	All species	Species group: Northern white-cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
Eastern Upper Peninsula												
Alger	137,519	661	6,612	6,486	10,261	4,530	1,106	1,629	626	1,243	23,672	3,524
Chippewa	107,527	982	10,395	4,695	20,690	3,826	1,683	4,109	847	368	24,003	7,206
Delta	146,953	790	8,499	4,761	14,680	3,195	1,375	3,439	752	840	45,189	4,689
Luce	72,399	553	5,622	5,744	8,698	2,315	924	3,284	496	560	10,275	467
Mackinac	94,285	508	5,669	2,245	4,509	2,022	735	4,127	393	530	30,202	6,868
Menominee	98,682	277	7,578	1,502	3,343	1,281	464	2,579	308	948	32,528	2,879
Schoolcraft	115,657	1,097	10,742	8,213	19,233	3,970	1,835	3,556	1,043	704	15,429	3,924
Total	773,022	4,868	55,117	33,647	81,415	21,137	8,123	22,722	4,466	5,192	181,296	29,556
Western Upper Peninsula												
Baraga	91,385	170	2,073	1,442	2,995	871	285	953	215	1,809	31,138	3,023
Dickinson	113,903	405	4,647	2,290	11,732	2,811	813	4,779	501	735	55,312	2,407
Gogebic	84,784	-	3,252	906	516	215	123	3,965	-	2,550	20,255	1,155
Houghton	127,812	187	3,655	1,654	5,220	1,344	398	2,410	168	3,627	27,962	3,196
Iron	183,759	564	12,355	3,633	10,686	4,079	1,229	11,142	578	2,543	61,070	6,185
Keweenaw	19,322	-	-	27	-	111	-	198	-	695	5,090	170
Marquette	326,296	1,646	17,435	23,962	36,943	6,019	2,847	12,581	1,687	1,954	76,699	9,172
Ontonagon	193,067	4	1,858	516	9,446	1,748	279	2,275	10	7,519	82,364	5,884
Total	1,140,329	2,975	45,276	34,432	77,537	17,197	5,974	38,304	3,158	21,433	359,890	31,193
Northern Lower Peninsula												
Alcona	52,371	-	26	-	788	43	4	16	-	582	33,748	1,959
Alpena	19,022	18	270	-	483	133	5	84	-	638	11,900	354
Antrim	8,444	-	-	-	68	383	-	-	-	147	3,729	6
Arenac	14,831	-	-	-	195	8	-	-	-	123	11,146	106
Bay	329	-	-	-	-	-	-	-	-	-	329	-
Benzie	19,566	-	-	-	-	53	-	-	-	585	6,621	-
Charlevoix	17,593	16	127	-	171	640	-	30	-	51	12,501	-
Cheboygan	58,121	96	864	-	11,942	666	118	270	-	234	30,825	373
Clare	59,207	-	-	-	667	-	-	-	-	71	46,011	25
Crawford	53,372	27	213	-	23,081	4,040	189	51	-	272	14,406	11
Emmet	22,668	6	119	-	2,636	589	25	53	-	103	11,797	31
Gladwin	20,825	-	-	-	344	18	-	-	-	57	15,531	52
Grand Traverse	18,081	-	-	-	7,091	1,281	54	-	-	178	3,194	25
Iosco	14,077	-	-	-	377	244	-	-	-	124	7,429	177
Isabella	17,163	-	-	-	-	65	-	-	-	4	10,315	-
Kalkaska	38,427	-	-	-	14,181	792	145	-	-	349	12,209	-
Lake	43,403	-	-	-	1,865	3,544	-	-	-	150	17,022	4
Leelanau	6,862	-	-	-	1,652	8	17	-	-	104	1,095	-
Manistee	47,467	-	-	-	135	671	-	-	-	979	18,158	-
Mason	26,870	-	-	-	-	-	-	-	-	89	15,005	5
Mecosta	34,026	-	-	-	13	-	-	-	-	469	21,305	-
Midland	18,266	-	-	-	35	-	-	-	-	148	10,415	21
Missaukee	44,404	-	-	-	3,012	650	9	-	-	477	23,920	20
Montmorency	54,474	-	30	-	2,995	430	25	-	-	789	29,135	1,644
Newaygo	30,397	-	-	-	-	-	-	-	-	281	16,125	1
Oceana	21,387	-	-	-	-	-	-	-	-	553	11,601	-
Ogemaw	30,809	1	7	-	4,734	51	20	2	-	188	17,223	267
Osceola	29,543	-	-	-	43	24	-	-	-	393	16,119	-
Oscoda	28,172	-	10	-	5,079	344	48	-	-	95	14,949	242
Otsego	37,641	15	400	-	4,364	704	42	208	-	105	20,499	43
Presque Isle	71,565	2	311	-	3,674	82	34	341	-	1,782	35,560	2,853
Roscommon	52,186	-	-	-	22,432	712	156	-	-	70	19,661	27
Wexford	23,143	-	-	-	1,599	1,513	4	-	-	722	7,521	70
Total	1,034,709	180	2,377	-	113,653	17,688	894	1,055	-	10,912	527,004	8,317
Southern Lower Peninsula												
Allegan	10,104	-	-	-	-	-	-	-	-	-	1,814	-
Barry	742	-	-	-	-	-	-	-	-	-	-	-
Calhoun	2,007	-	-	-	-	-	-	-	-	-	-	-
Cass	471	-	-	-	-	-	-	-	-	-	-	-
Clinton	597	-	-	-	-	-	-	-	-	104	-	-
Eaton	3,617	-	-	-	-	-	-	-	-	260	-	-
Gratiot	147	-	-	-	9	-	-	-	-	-	138	-
Jackson	13	-	-	13	-	-	-	-	-	-	-	-
Kalamazoo	2,329	-	-	-	-	-	-	-	-	-	-	-
Kent	9,233	-	-	-	-	-	-	-	-	4	3,672	-
Montcalm	14,311	-	-	-	-	17	-	-	-	365	4,278	-
Muskegon	14,165	-	-	-	-	-	-	-	-	233	5,710	-
Ottawa	3,183	-	-	-	-	-	-	-	-	-	274	-
Saginaw	18	-	-	-	-	-	-	-	-	-	-	-
Shiawassee	331	-	-	-	-	-	-	-	-	-	229	-
St Joseph	2,527	-	-	-	-	-	-	-	-	-	-	-
Van Buren	962	-	-	-	-	-	-	-	-	-	-	-
Total	64,755	-	-	13	9	17	-	-	-	967	16,116	-
State total	3,012,815	8,023	102,769	68,091	272,614	56,040	14,992	62,081	7,624	38,504	1,084,306	69,066

(Table 9 continued on next page.)

(Table 9 continued.)

MICHIGAN

Forest Survey Unit and county[1]	Species group											
	Basswood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
Eastern Upper Peninsula												
Alger	2,002	3,787	6,541	2,386	-	2	-	36,684	22,201	1,362	-	2,206
Chippewa	600	1,132	4,850	477	-	-	-	10,250	10,730	241	-	439
Delta	2,052	2,785	9,018	14,443	-	11	-	12,083	15,790	757	19	1,786
Luce	821	1,340	3,431	651	-	-	-	16,849	9,110	763	-	497
Mackinac	683	1,203	10,188	1,120	-	-	-	12,088	10,049	266	-	882
Menominee	1,599	1,439	13,793	871	-	15	-	15,433	9,982	857	36	971
Schoolcraft	966	2,251	5,451	1,474	-	2	-	20,847	12,826	733	9	1,353
Total	8,724	13,937	53,271	21,422	-	30	-	124,233	90,689	4,980	65	8,133
Western Upper Peninsula												
Baraga	3,030	440	7,861	1,442	-	11	-	20,786	11,253	1,112	14	462
Dickinson	1,725	207	7,628	651	-	32	-	10,250	6,070	531	39	337
Gogebic	2,979	-	2,413	1,355	-	51	-	26,799	14,586	2,713	217	733
Houghton	4,949	574	12,192	2,498	-	16	-	35,925	18,505	2,327	39	967
Iron	5,037	576	9,690	1,946	-	42	-	31,081	17,959	2,181	109	1,074
Keweenaw	750	-	1,094	430	-	-	-	6,919	3,315	421	-	102
Marquette	4,283	6,003	25,828	4,085	-	38	-	54,512	34,840	1,897	107	3,757
Ontonagon	10,824	5	4,817	3,535	-	27	-	40,947	16,981	3,479	231	317
Total	33,576	7,805	71,524	15,942	-	216	-	227,219	123,511	14,661	755	7,750
Northern Lower Peninsula												
Alcona	897	90	2,388	-	-	-	-	488	3,751	6,830	759	1
Alpena	254	111	1,083	-	-	-	-	332	2,878	438	40	-
Antrim	161	64	332	-	-	-	-	2,391	1,012	145	5	-
Arenac	19	8	944	-	-	-	-	104	1,808	340	30	-
Bay	-	-	-	-	-	-	-	-	-	-	-	-
Benzie	1,545	986	1,539	5	-	-	-	3,797	3,080	651	113	591
Charlevoix	90	90	434	-	-	-	-	1,980	1,463	-	-	-
Cheboygan	923	160	2,686	-	-	-	-	1,921	5,756	1,280	5	-
Clare	42	41	2,192	-	-	-	-	923	7,607	1,277	314	39
Crawford	183	152	1,123	-	-	-	-	811	2,931	5,694	159	28
Emmet	226	124	1,194	-	-	-	-	2,634	3,127	2	-	2
Gladwin	58	6	1,036	-	-	-	-	277	2,683	638	126	-
Grand Traverse	777	363	364	-	-	-	-	2,149	2,203	201	100	100
Iosco	50	19	1,519	-	-	-	-	795	1,578	1,589	177	-
Isabella	523	1	1,084	-	208	104	-	8	1,145	3,136	569	-
Kalkaska	142	191	1,048	-	-	-	-	3,036	5,264	910	158	-
Lake	239	173	1,097	-	-	-	-	411	1,904	13,455	3,425	115
Leelanau	447	392	424	-	-	-	-	1,256	1,115	335	-	15
Manistee	502	928	2,043	-	-	-	-	2,914	8,810	10,102	1,603	622
Mason	297	331	1,424	-	-	-	-	642	3,002	4,993	1,005	77
Mecosta	494	596	1,089	-	417	-	-	1,718	2,462	4,187	1,196	81
Midland	84	43	1,708	-	1,042	-	-	153	3,421	943	254	-
Missaukee	1,869	650	2,178	-	-	-	-	2,373	5,318	2,646	1,079	205
Montmorency	3,140	117	2,879	-	-	-	-	2,952	6,322	3,660	355	-
Newaygo	243	558	485	-	104	104	-	1,178	3,165	5,148	2,983	21
Oceana	589	575	663	-	260	104	104	1,252	1,266	3,527	890	3
Ogemaw	216	70	1,873	-	-	-	-	744	3,198	2,061	147	8
Osceola	404	673	1,549	-	26	-	-	590	2,980	5,485	1,255	3
Oscoda	197	57	1,215	-	-	-	-	986	1,934	2,798	220	-
Otsego	581	192	1,018	-	-	-	-	4,434	4,870	168	-	-
Presque Isle	1,758	242	8,961	-	-	-	-	1,021	9,633	4,787	523	-
Roscommon	35	22	1,222	-	-	-	-	685	4,219	2,924	21	-
Wexford	922	825	785	-	-	-	-	4,158	3,572	849	311	292
Total	17,906	8,851	49,578	5	2,057	313	104	49,114	113,479	91,198	17,822	2,202
Southern Lower Peninsula												
Allegan	-	-	-	-	-	-	-	-	1,062	3,599	3,630	-
Barry	-	-	-	-	-	-	-	-	204	258	279	-
Calhoun	-	-	-	-	-	-	-	-	-	964	1,042	-
Cass	-	-	-	-	-	-	-	-	41	207	223	-
Clinton	-	104	-	-	-	-	53	-	-	156	179	-
Eaton	260	521	52	-	52	52	52	521	521	700	625	-
Gratiot	-	-	-	-	-	-	-	-	-	-	-	-
Jackson	-	-	-	-	-	-	-	-	-	-	-	-
Kalamazoo	-	-	-	-	-	-	-	-	-	1,119	1,210	-
Kent	2	1	3	-	-	-	-	470	1,227	2,042	1,809	2
Montcalm	521	104	575	-	-	-	-	-	1,352	3,453	3,647	-
Muskegon	5	213	223	-	-	-	-	556	607	3,421	3,186	9
Ottawa	-	-	-	-	-	-	-	-	490	1,242	1,177	-
Saginaw	-	-	-	-	-	-	-	-	18	-	-	-
Shiawassee	-	-	-	-	-	-	-	-	-	102	-	-
St Joseph	-	-	-	-	-	-	-	-	735	861	931	-
Van Buren	-	-	-	-	-	-	-	-	245	344	372	-
Total	789	943	853	-	52	52	105	1,547	6,502	18,468	18,312	11
State total	60,995	31,536	175,226	37,369	2,109	611	209	402,114	334,180	129,307	36,954	18,096

[1] Includes only those counties that supplied pulpwood in 1994.

Table 10. -- Pulpwood production from roundwood by county and species group, Minnesota, 1994

(In standard cords, unpeeled)

Forest Survey Unit and county[1]	All species	Species group: Northern white-cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
Aspen-Birch												
Carlton	46,867	-	9,761	-	1,268	1,836	27	2,406	36	8	21,266	2,042
Cook	66,055	-	5,974	-	4,375	90	-	8,765	52	2	43,696	1,414
Koochiching	475,842	-	32,668	-	8,749	1,056	-	61,213	1,258	6	320,963	48,120
Lake	107,256	-	11,997	-	7,127	285	-	17,448	323	1,786	44,468	5,072
St Louis	622,290	-	53,423	-	17,556	3,568	-	46,680	701	255	431,286	42,350
Total	1,318,309	-	113,823	-	39,075	6,835	27	136,512	2,370	2,058	861,679	98,997
Northern Pine												
Aitkin	101,776	-	5,055	-	866	1,154	-	435	-	48	87,089	2,759
Becker	91,561	-	682	-	1,263	-	-	-	-	-	89,225	135
Beltrami	204,648	-	4,521	-	7,866	418	-	5,619	567	-	171,387	6,132
Cass	168,005	-	6,364	-	8,591	3,013	-	1,665	-	39	142,276	1,285
Clearwater	68,195	-	2,048	-	234	24	-	266	-	-	63,375	1,104
Crow Wing	76,745	-	-	-	6,009	1,416	-	15	-	-	67,486	-
Hubbard	115,055	-	436	-	3,927	374	-	228	-	-	104,387	2,249
Itasca	344,093	-	48,807	-	4,482	797	-	17,679	-	98	248,425	7,468
Lake of the Woods	50,754	-	1,838	-	9,365	33	-	1,723	-	-	36,895	901
Mahnomen	17,242	-	-	-	-	-	-	-	-	-	17,242	-
Roseau	27,178	-	110	-	7,706	63	-	220	-	-	18,285	794
Wadena	17,518	-	-	-	2,076	328	-	-	-	2	15,053	-
Total	1,282,770	-	69,862	-	52,385	7,620	-	27,848	567	187	1,061,123	22,826
Central Hardwood												
Anoka	74	-	-	-	-	74	-	-	-	-	-	-
Benton	744	-	-	-	-	-	-	-	-	-	744	-
Carver	309	-	-	-	-	-	-	-	-	-	309	-
Chisago	1,637	-	-	-	-	1,615	-	-	-	-	22	-
Douglas	10	-	-	-	-	10	-	-	-	-	-	-
Isanti	1,975	-	23	-	41	1,397	-	14	-	-	501	-
Kanabec	22,156	-	9	-	-	186	-	-	-	100	21,561	-
Mille Lacs	49,888	-	-	-	-	252	-	-	-	-	49,114	-
Morrison	12,397	-	-	-	234	237	-	-	-	-	11,926	-
Otter Tail	26,918	-	-	-	94	-	-	-	-	-	26,620	204
Pine	101,177	-	1,366	-	6,028	2,211	-	533	-	856	83,574	-
Sherburne	1,099	-	-	-	12	1,022	-	66	-	-	-	-
Todd	3,261	-	-	-	234	-	-	-	-	-	3,026	-
Wabasha	526	-	-	-	-	486	40	-	-	-	-	-
Total	222,171	-	1,398	-	6,643	7,491	40	613	-	956	197,396	204
Prairie												
Clay	60	-	-	-	-	-	-	-	-	-	60	-
Kittson	129	-	-	-	-	-	-	-	-	-	129	-
Marshall	9,317	-	-	-	-	-	-	-	-	-	9,317	-
Norman	5,668	-	-	-	-	-	-	-	-	-	5,668	-
Pennington	3,701	-	-	-	-	-	-	-	-	-	3,701	-
Polk	10,365	-	-	-	-	-	-	-	-	-	10,365	-
Red Lake	5,829	-	-	-	-	-	-	-	-	-	5,829	-
Total	35,069	-	-	-	-	-	-	-	-	-	35,069	-
State total	2,858,319	-	185,084	-	98,103	21,945	67	164,973	2,937	3,200	2,155,268	122,028

(Table 10 continued on next page.)

(Table 10 continued.)

MINNESOTA

Forest Survey Unit and county[1]	Species group											
	Basswood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
Aspen-Birch												
Carlton	17	-	7,931	5	-	-	-	96	161	5	-	1
Cook	1	-	1,653	1	-	-	-	21	10	1	-	-
Koochiching	5	-	1,467	4	-	-	-	76	252	4	-	1
Lake	2,286	-	15,097	1	-	-	-	632	731	2	-	-
St Louis	98	-	18,134	4	-	-	-	426	7,802	5	-	1
Total	2,407	-	44,283	16	-	-	-	1,251	8,956	18	-	3
Northern Pine												
Aitkin	64	-	355	-	-	-	-	29	3,919	3	-	-
Becker	-	-	256	-	-	-	-	-	-	-	-	-
Beltrami	-	-	7,990	-	-	-	-	-	149	-	-	-
Cass	39	-	3,863	28	-	-	-	531	275	28	-	9
Clearwater	-	-	1,144	-	-	-	-	-	-	-	-	-
Crow Wing	-	-	1,820	-	-	-	-	-	-	-	-	-
Hubbard	-	-	3,454	-	-	-	-	-	-	-	-	-
Itasca	166	-	10,887	8	-	-	-	656	4,608	8	-	3
Lake of the Woo	-	-	-	-	-	-	-	-	-	-	-	-
Mahnomen	-	-	-	-	-	-	-	-	-	-	-	-
Roseau	-	-	-	-	-	-	-	-	-	-	-	-
Wadena	2	-	15	1	-	-	-	26	14	1	-	-
Total	271	-	29,783	38	-	-	-	1,243	8,964	41	-	13
Central Hardwood												
Anoka	-	-	-	-	-	-	-	-	-	-	-	-
Benton	-	-	-	-	-	-	-	-	-	-	-	-
Carver	-	-	-	-	-	-	-	-	-	-	-	-
Chisago	-	-	-	-	-	-	-	-	-	-	-	-
Douglas	-	-	-	-	-	-	-	-	-	-	-	-
Isanti	-	-	-	-	-	-	-	-	-	-	-	-
Kanabec	-	-	59	-	-	-	-	43	197	-	-	-
Mille Lacs	-	-	-	-	-	-	-	-	522	-	-	-
Morrison	-	-	-	-	-	-	-	-	-	-	-	-
Otter Tail	-	-	-	-	-	-	-	-	-	-	-	-
Pine	52	-	959	-	-	-	-	225	5,077	296	-	-
Sherburne	-	-	-	-	-	-	-	-	-	-	-	-
Todd	-	-	-	-	-	-	-	-	-	-	-	-
Wabasha	-	-	-	-	-	-	-	-	-	-	-	-
Total	52	-	1,018	-	-	-	-	269	5,796	296	-	-
Prairie												
Clay	-	-	-	-	-	-	-	-	-	-	-	-
Kittson	-	-	-	-	-	-	-	-	-	-	-	-
Marshall	-	-	-	-	-	-	-	-	-	-	-	-
Norman	-	-	-	-	-	-	-	-	-	-	-	-
Pennington	-	-	-	-	-	-	-	-	-	-	-	-
Polk	-	-	-	-	-	-	-	-	-	-	-	-
Red Lake	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-	-	-	-	-	-
State total	2,730	-	75,084	53	-	-	-	2,762	23,716	354	-	16

[1] Includes only those counties that supplied pulpwood in 1994.

Table 11. -- Pulpwood production from roundwood by county and species group, Wisconsin, 1994

(In standard cords, unpeeled)

Forest Survey Unit and county[1]	All species	Species group: Northern white-cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
Northeast												
Florence	72,346	22	2,037	3,238	2,357	1,605	201	1,267	122	1,079	33,336	808
Forest	139,745	-	5,688	2,412	1,071	3,917	369	3,297	63	4,617	41,868	938
Langlade	132,316	-	4,279	1,390	1,712	4,771	273	1,451	146	4,415	50,088	217
Lincoln	107,730	-	2,892	577	2,667	2,480	644	827	605	3,932	48,495	101
Marinette	133,085	6	5,129	365	23,170	20,421	1,057	522	442	1,543	48,244	732
Menominee	75,643	147	1,535	17,504	1,829	2,307	2,707	327	133	2,295	22,456	150
Oconto	71,164	-	833	159	7,458	9,836	931	13	9	1,005	26,553	454
Oneida	161,853	-	5,246	1,551	8,854	8,411	1,899	2,772	1,260	5,730	49,455	270
Shawano	25,572	-	36	340	372	2,115	208	35	203	429	17,217	3
Vilas	146,871	-	3,819	600	15,354	4,090	2,105	1,832	272	2,621	55,638	359
Total	1,066,324	176	31,494	28,136	64,843	59,952	10,396	12,344	3,256	27,667	393,353	4,033
Northwest												
Ashland	82,438	-	3,186	299	1,487	2,122	693	4,182	786	2,186	34,599	9
Barron	22,691	-	14	11	1,350	1,246	47	120	860	676	9,428	5
Bayfield	196,751	-	1,308	33	49,784	7,091	578	949	56	2,887	84,367	11
Burnett	78,630	-	180	14	36,052	9,243	127	93	13	1,162	23,694	1
Douglas	177,846	-	10,356	-	57,276	14,061	176	2,421	133	2,127	67,165	-
Iron	151,210	-	4,158	895	1,665	914	326	2,980	76	4,127	77,873	313
Polk	27,230	-	13	-	5,631	729	28	88	-	336	16,399	-
Price	142,693	-	6,488	843	1,066	4,039	579	2,234	1,251	4,580	66,709	86
Rusk	111,785	-	408	305	910	1,418	361	747	646	3,624	53,066	44
Sawyer	139,451	-	2,371	178	3,785	8,216	652	968	683	3,779	53,241	14
Taylor	77,695	-	2,214	1,120	104	418	76	785	361	2,258	42,865	50
Washburn	103,142	-	700	19	18,318	11,082	276	208	6	1,977	43,623	6
Total	1,311,562	-	31,395	3,717	177,428	60,579	3,919	15,775	4,873	29,721	573,027	539
Central												
Adams	78,054	-	-	-	39,418	17,112	1,533	71	-	186	2,414	1
Chippewa	37,390	-	70	90	226	945	213	32	146	1,091	22,139	13
Clark	84,182	-	14	9	4,431	1,862	1,015	10	-	2,095	37,764	10
Eau Claire	53,382	-	2	-	15,431	4,286	701	219	-	836	14,728	5
Jackson	99,933	-	-	10	58,827	6,195	1,627	83	8	598	17,655	1
Juneau	54,550	-	5	-	29,853	7,561	556	-	-	291	2,569	-
Marathon	62,527	-	121	892	1,175	5,292	303	711	74	2,214	32,121	21
Marquette	12,909	-	-	-	1,092	9,666	475	24	-	53	261	-
Monroe	26,769	-	-	-	12,554	6,968	527	10	-	192	1,620	-
Portage	34,738	-	9	165	8,993	9,284	1,633	52	183	415	8,268	10
Waupaca	20,968	-	15	9	1,263	10,026	438	90	-	252	6,196	6
Waushara	31,791	-	-	-	1,806	22,720	1,679	86	8	192	1,374	-
Wood	43,046	-	5	42	15,165	3,244	962	43	-	697	15,403	3
Total	640,239	-	241	1,217	190,233	105,161	11,662	1,433	419	9,111	162,513	70
Southwest												
Buffalo	6,303	-	-	-	20	1,083	290	-	-	11	4,722	-
Crawford	393	-	-	-	13	208	-	-	-	1	16	-
Dunn	15,986	-	-	-	795	3,844	127	115	-	415	5,673	3
Grant	3,872	-	-	-	14	3,582	42	-	-	16	-	-
Iowa	1,190	-	-	-	13	840	329	9	-	-	-	-
La Crosse	6,367	-	-	-	747	4,309	683	15	-	14	-	-
Lafayette	14	-	-	-	-	-	-	14	-	-	-	-
Pepin	1,641	-	-	-	77	783	138	71	-	3	514	-
Pierce	1,294	-	10	-	106	427	153	70	-	1	516	-
Richland	1,703	-	-	-	149	1,132	272	89	-	3	14	-
Sauk	8,381	-	-	-	1,596	3,987	912	17	-	21	262	-
St Croix	9,094	-	-	-	1,075	3,444	76	160	-	-	4,326	-
Trempealeau	8,145	-	3	-	355	5,342	514	170	-	29	944	-
Vernon	724	-	-	-	48	445	97	-	-	4	-	-
Total	65,109	-	14	-	5,007	29,426	3,632	728	-	519	16,987	3
Southeast												
Brown	15,289	-	-	13	10	336	-	-	-	49	11,949	1,440
Calumet	63	-	-	-	-	21	-	-	-	4	-	-
Columbia	4,610	-	6	-	82	2,803	249	31	-	4	143	-
Dane	1,003	-	-	-	-	599	224	10	-	20	-	-
Dodge	632	-	-	-	-	149	398	72	-	2	-	-
Door	1,726	-	-	-	-	59	-	-	-	32	226	1
Fond Du Lac	12	-	-	-	12	-	-	-	-	-	-	-
Green	1,592	-	-	-	57	646	755	17	-	1	-	-
Green Lake	818	-	11	13	42	458	48	-	-	12	114	-
Jefferson	2,175	-	-	8	1,624	471	60	-	-	1	-	-
Kenosha	79	-	-	-	14	65	-	-	-	-	-	-
Kewaunee	1,593	-	-	13	-	45	14	-	-	58	99	-
Manitowoc	446	-	-	14	25	116	282	-	-	-	9	-
Milwaukee	27	-	-	-	16	11	-	-	-	-	-	-
Outagamie	1,726	-	-	-	-	496	45	14	6	38	778	-
Ozaukee	176	-	-	-	-	85	27	64	-	-	-	-
Rock	643	-	-	-	11	476	53	-	-	12	-	-
Sheboygan	60	-	-	-	-	60	-	-	-	-	-	-
Walworth	1,356	-	-	-	44	901	411	-	-	-	-	-
Washington	1,231	-	11	-	11	509	391	296	-	1	-	-
Waukesha	1,984	-	-	-	22	1,060	902	-	-	-	-	-
Winnebago	521	-	-	-	124	41	24	-	-	20	-	-
Total	37,763	-	29	59	2,094	9,409	3,883	503	6	255	13,318	1,441
State total	3,120,997	176	63,172	33,130	439,605	264,526	33,492	30,783	8,555	67,273	1,159,197	6,086

(Table 11 continued on next page.)

(Table 11 continued.)

Wisconsin

Forest Survey Unit and county[1]	Species group												
	Basswood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
Northeast												
Florence	1,451	14	4,946	654	11	443	-	11,066	6,523	798	141	226
Forest	2,424	168	12,036	1,871	30	5,358	-	27,403	20,029	3,395	1,923	869
Langlade	2,755	59	14,120	1,358	60	2,115	-	21,453	16,033	3,190	1,619	812
Lincoln	3,992	72	9,450	658	101	2,266	-	11,986	8,110	5,911	852	1,112
Marinette	1,593	10	7,873	696	20	54	-	11,046	7,427	1,696	706	332
Menominee	422	182	1,869	1,080	4	2,377	-	8,739	7,385	1,420	511	262
Oconto	931	23	7,965	521	7	674	-	7,766	4,899	745	204	177
Oneida	9,700	7	23,513	463	269	470	-	18,157	10,707	9,999	1,056	2,062
Shawano	96	22	308	190	2	687	-	1,469	1,349	292	175	23
Vilas	3,738	3	25,704	699	74	264	-	15,153	8,985	3,858	947	753
Total	27,103	561	107,784	8,190	578	14,708	-	134,238	91,447	31,304	8,135	6,628
Northwest												
Ashland	1,059	3	7,057	428	9	351	-	11,005	8,325	2,864	1,165	622
Barron	554	-	1,993	27	5	17	-	1,988	2,849	1,128	149	225
Bayfield	1,444	2	22,313	565	11	214	-	8,893	9,249	4,034	1,559	404
Burnett	317	-	1,852	55	1	27	-	1,957	2,100	1,219	346	179
Douglas	335	1	15,217	105	-	79	-	2,050	4,816	913	541	74
Iron	5,074	5	10,487	932	106	392	-	20,228	12,417	5,951	1,022	1,271
Polk	327	-	1,280	7	-	5	-	632	1,129	469	93	62
Price	3,730	39	15,681	904	85	1,323	-	14,793	11,150	5,165	730	1,217
Rusk	3,573	23	10,628	701	44	976	-	15,827	11,646	4,472	1,400	965
Sawyer	2,459	10	21,502	1,309	14	675	-	18,039	15,590	3,491	1,637	839
Taylor	2,190	53	5,325	472	50	1,722	-	7,781	6,146	2,616	542	547
Washburn	1,399	1	7,435	219	6	100	-	5,542	9,525	1,829	550	320
Total	22,461	137	120,768	5,724	331	5,881	-	109,736	94,942	34,150	9,733	6,725
Central												
Adams	58	-	286	14	-	1	-	299	503	13,167	2,744	248
Chippewa	1,054	3	2,398	126	13	135	-	3,463	2,826	1,756	290	362
Clark	657	38	4,858	683	10	1,345	-	11,529	7,553	6,333	3,569	397
Eau Claire	314	-	2,461	157	5	118	-	3,552	2,697	5,028	2,648	196
Jackson	152	1	1,606	100	1	106	-	2,645	2,795	4,884	2,202	437
Juneau	45	-	497	11	-	8	-	829	758	8,983	2,545	39
Marathon	770	135	1,165	822	21	4,091	-	5,757	4,962	1,425	266	190
Marquette	11	-	97	10	-	3	-	200	165	548	290	12
Monroe	9	-	238	9	-	7	-	663	405	2,821	730	14
Portage	349	14	437	118	10	462	-	1,223	1,166	1,233	641	73
Waupaca	181	14	119	103	5	432	-	725	684	276	117	18
Waushara	37	-	186	29	-	11	-	363	349	2,469	438	43
Wood	158	3	1,002	169	3	121	-	2,474	1,679	1,107	663	103
Total	3,795	208	15,350	2,353	68	6,841	-	33,720	26,542	50,029	17,141	2,132
Southwest												
Buffalo	2	-	32	2	-	1	-	60	52	9	7	12
Crawford	6	-	1	-	-	-	-	4	3	104	37	-
Dunn	384	-	906	38	3	24	-	1,501	1,119	768	119	151
Grant	-	-	9	1	-	-	-	52	70	61	18	8
Iowa	-	-	-	-	-	-	-	-	-	-	-	-
La Crosse	1	-	15	-	-	-	-	9	209	277	39	49
Lafayette	-	-	-	-	-	-	-	-	-	-	-	-
Pepin	1	-	6	2	-	4	-	20	15	3	2	1
Pierce	-	-	2	-	-	-	-	4	3	1	-	-
Richland	-	-	3	-	-	-	-	14	8	10	7	1
Sauk	14	-	47	2	-	2	-	93	65	984	352	29
St Croix	-	-	2	-	-	-	-	5	3	1	1	-
Trempealeau	19	-	70	4	-	3	-	144	100	272	167	10
Vernon	1	-	8	1	-	-	-	28	19	52	19	2
Total	429	-	1,103	51	3	34	-	1,934	1,666	2,542	768	264
Southeast												
Brown	756	5	69	13	1	7	-	189	397	31	14	10
Calumet	-	-	2	2	-	-	-	15	15	2	2	-
Columbia	1	-	8	-	-	-	-	15	9	777	479	2
Dane	9	-	36	-	-	-	-	37	17	43	-	8
Dodge	1	-	3	-	-	-	-	3	1	3	-	1
Door	36	-	1,104	4	-	-	-	126	66	56	2	12
Fond Du Lac	-	-	-	-	-	-	-	-	-	-	-	-
Green	1	-	3	-	-	-	-	4	2	94	10	2
Green Lake	5	-	19	-	-	-	-	26	15	47	4	4
Jefferson	-	-	1	-	-	-	-	4	4	1	-	-
Kenosha	-	-	-	-	-	-	-	-	-	-	-	-
Kewaunee	8	-	99	20	-	5	-	302	235	440	246	9
Manitowoc	-	-	-	-	-	-	-	-	-	-	-	-
Milwaukee	-	-	-	-	-	-	-	-	-	-	-	-
Outagamie	1	-	27	17	-	-	-	134	127	24	18	2
Ozaukee	-	-	-	-	-	-	-	-	-	-	-	-
Rock	-	-	-	-	-	-	-	-	54	-	-	37
Sheboygan	-	-	-	-	-	-	-	-	-	-	-	-
Walworth	-	-	-	-	-	-	-	-	-	-	-	-
Washington	1	-	3	-	-	-	-	3	1	3	-	-
Waukesha	-	-	-	-	-	-	-	-	-	-	-	-
Winnebago	1	-	16	9	-	-	-	79	74	79	54	-
Total	820	5	1,390	65	1	13	-	938	1,017	1,601	828	88
State total	54,608	911	246,395	16,383	981	27,477	-	280,566	215,614	119,626	36,605	15,837

[1] Includes only those counties that supplied pulpwood in 1994.

Table 12. -- Central States pulpwood production by State and destination, 1990-1994

(In thousand standard cords, unpeeled)

	Illinois			Indiana			Iowa			Missouri		
		Destination			Destination			Destination			Destination	
Year	Total	Central States	Other States	Total	Central States	Other States	Total	Central States	Other States	Total	Central States	Other States
1990	76	33	43	189	75	114	14	14	-	95	19	76
1991	81	37	44	157	56	101	14	14	-	87	17	70
1992	77	33	44	150	49	101	12	12	-	116	22	94
1993	55	25	30	143	47	96	13	13	-	78	13	65
1994	76	33	43	147	51	96	22	22	(1/)	88	19	69

1/ Less than 500 standard cords.

Table 13. -- Trends in receipts of roundwood and residue as pulpwood, Central States, 1990-1994

(In thousand standard cords, unpeeled)

Type of material and area	1990	1991	1992	1993	1994
Roundwood					
Indiana, Iowa, Missouri	44	44	33	28	42
Residue					
Indiana, Iowa, Missouri	97	85	83	71	86
All material	141	129	116	99	127

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Lake States pulpwood production increased 4 percent—from 9.4 million cords to 9.7 million cords. Central States pulpwood production increased 16 percent—from 288 thousand cords in 1993 to 333 thousand cords in 1994. Plains States pulpwood production was 111 thousand cords. Pulpwood production is shown by county and species group for Michigan, Minnesota, Wisconsin.

KEY WORDS: Roundwood, whole-tree-chips, residue, pulpwood, particleboard, Minnesota, Michigan, Wisconsin, Illinois, Iowa, Indiana, Missouri, Plains States.

Our job at the North Central Forest Experiment Station is discovering and creating new knowledge and technology in the field of natural resources and conveying this information to the people who can use it. As a new generation of forests emerges in our region, managers are confronted with two unique challenges: (1) Dealing with the great diversity in composition, quality, and ownership of the forests, and (2) Reconciling the conflicting demands of the people who use them. Helping the forest manager meet these challenges while protecting the environment is what research at North Central is all about.